

**The Proceedings  
of the  
11th Annual  
HISTORY  
OF  
MEDICINE DAYS**

**FACULTY OF MEDICINE  
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INA ΣΗΕΥΑΗΤΕ ΤΑ ΚΑΙΝΑ

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# Contents

Participating Students and their Universities .....	v
Preceptors and their Universities .....	viii
Preface and Acknowledgements .....	x
<b>Presentations:</b>	
<i>Session 1 - Philosophy Runs Through It</i>	
A Tale of Two 'Philosophes'.....J. Ashley Davidson .....	1
Will 'The Simpsons' Make Me a Better Physician: An Examination of Current and Classical Medical Criticism.....Douglas Mack .....	10
<i>Session 2 - We Are What We Eat</i>	
Foxgloves, Woody Beans, and an Old Hag: Nothing New Under the Sun .....	Susan Poelman ..... 16
Nutmeg: Only a Spice? .....	Joslyn Conley.....21
Goiters, Fish and Iodized Salt .....	Fred Ball.....27
<i>Session 3 - Fellow Healers</i>	
Medical Eponyms: Praise and Criticism .....	Anna Mayer .....34
It's All in the Palm of Your Hand.....	Amrita Sarpal .....38
Letting the Genie Out of the Bottle: Evolution of Aromatherapy through the Ages .....	Valeria Lyubetska .....43
The Historical Development of Chiropractic .....	Dean Swedlo .....55
The Separation of the Professions of Pharmacy And Medicine .....	Amy Gausvik .....59

#### ***Session 4 - Professions and Infections***

The Passing of the Blade: Early European Surgical Contributions to Modern Day Surgical Education .....	Heather Cox .....	64
John Snow: Cholera in London in the 1800's.....	Colleen Ryan.....	68
Sanitation Across the Nation: The Rocky Road to Community, Hospital and Surgical Cleanliness in Victorian England .....	Anne Wormsbecker.....	73
The Affair of the Itch: Discovery of the Etiology of Scabies .....	Kathryn Ng.....	78

#### ***Session 5 - Plagues***

Smallpox in the Aboriginal People of Russian-America .....	Vishal Avinashi.....	84
Cholera Outbreaks: Have We Learned From the Past .....	Sarah Lenihan .....	90
Plague, Politics and Prejudice: The Social Construction of The Plague in 20 <sup>th</sup> Century California.....	Theresa Liu .....	96
Deadly Prayer .....	Clarrisa Fauth.....	107
Globalization of Tobacco: In the Words of the Industry - An Exploration of 60 Years of Internal Industry Documents .....	Monika Dutt .....	111

#### ***Session 6 - Doctors and Babies***

The Birth of Gynecology: Obstetrics in Greece and Rome.....	Katalin É. Mayer.....	121
"Untimely Ripp'd" Cesarean Section - A Brief History .....	Darren Cargill .....	128
The History of Oral Contraception.....	Chasta Bacsu.....	133
Catching Babies Then and Now (Obstetrics in Calgary 1884 - 2002).....	Jennifer Ringrose .....	139
Michelangelo and the Kidney.....	Agnieszka Wojciechowski..	145

### ***Session 7 - Diagnosis and Treatment***

From Haircutter to Hemochromatosis: A History of Bloodletting .....	Scott Hamilton .....	149
Is it Easier to Make a Choice of Stethoscope in 2002 than in 1819? Some Thoughts on the "Evolution" .....	Sonia Bedi .....	156
Analyzing Changes in Traditional Acupuncture in the West: A Case Study in Vancouver, British Columbia .....	Kathleen Dooling .....	162
Fever Therapy in the Treatment of Syphilis .....	Catherine Hui .....	168

### ***Session 8 - Hopes and Theories***

Radiotherapy of Brain Tumors - 105 Years of Searching For the Cure 1897 - 2002 .....	Douglas Scott .....	173
Kennedy and Addison's Disease: Did an Illness Shape A Presidency? .....	Elizabeth James .....	184
Lighthouse Keeper's Madness: Folk Legend or Something More Toxic? .....	Michaela Walter .....	190

### ***Session 9 - Images and Surgeons***

Cleft Lip and Cleft Palate Repairs: Victims of Surgical Indifference? .....	Laura Snell .....	197
Norman Bethune and his Battle against Tuberculosis .....	Amy Morse .....	201
Pioneers of Heart Surgery .....	Hui-Sen Chong .....	205
The Gurdy - A Lesson in Medicine .....	Kimberly Veale .....	210

### ***Session 10 - The Course of Science Never Did Run Smooth***

A Scientist's Fib or a Nation's Folly? A Tale of Cockroaches, National Pride and Cancer-Causing Worms .....	Mark Bromley .....	216
ASA A.S.A.P. Aspirin: The Making of a Modern Day Panacea .....	Shamir Patel & Nakul Sharma .....	220

On the Philosophical and Historical Implications of the Infamous Tuskegee Syphilis Trials .....	Tomas Jiminez .....	229
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### ***Session 11 - Brain, Minds and Society***

Jean-Martin Charcot: On Neurology, Psuedo-Alienism, And The Teaching of Freud .....	Melanie Marsh .....	241
The Little Prince: Alien or Asperger's? .....	Genevieve Eastabrook .....	246
Medical Victimology: A History of a Young Medical Field in Light of New Realities of the 21 <sup>st</sup> Century .....	Andrei Metelitsa.....	254
The Good, the Bad, and the Ugly: The Concept of Sickness as Punishment.....	Yuki Asai .....	261
"What Seems to be the Matter?" vs. "Where Does it Hurt?" - Pain Management in 1800 and 2002 .....	Ursula Hines.....	265

### ***Session 12 - Doctors and Health Care***

Islamic Hospital.....	Farah Saleem.....	271
Utah's 19 <sup>th</sup> Century Doctor Shortage: A Progressive Solution .....	Robert Crawford .....	275
An Examination of the Experiences of Doctors Practicing In Isolated Environments.....	Chris Robertson .....	279
Health Care in World War II Japanese - Canadian Internment Camps .....	Wendy Tsang .....	289
Responsibility and Humanity: Exploring the Relationship Between Adolescent Risk-Taking Behavior and Organ Supply.....	Mohammed Shamji.....	294

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## ***Preface & Acknowledgements***

History of Medicine Days is an annual event that gathers medical students from across Canada to present brief papers on history topics of their choice. This year 54 papers were presented by students from the medical schools at Memorial, Dalhousie, Queen's, Western Ontario, Manitoba, Saskatchewan, Alberta and Calgary. The titles testify to the wide range of interest and concerns of young physicians in the year 2002. They cover events from as far back as history is recorded, but concentrate on themes from the 20<sup>th</sup> and 21<sup>st</sup> centuries, and raise issues relevant to everyday practise and the meaning of modern medicine both as a profession and as a healing art. Presentation styles ran from the humorous and detached to the engaged and polemical. Dr. Larry Clein's charming and insightful lecture, "*Harvey Cushing: You Should Have Been a Rocket Scientist*", gave a balanced judgement of a famous neurosurgeon. The surrounding social activities stimulated many lively discussions which we hope will continue through the future careers of the participants.

The essays in this volume cannot capture the spirit of the event, the impression the students made with their presentations, or all of their passion about issues in the history of medicine, but they do convey the depth of their research, the range of their interest, and their skill at writing.

History of Medicine Days owes its existence to the efforts of many people. Each of the students devoted many long hours stolen from a very pressing medical school curriculum to the research and writing of these papers, and to the preparation of their oral presentations or audio-visual material. Many of them were inspired or assisted by volunteer faculty members whose enthusiasm for the lessons to be learned from history can drag them also away from their day-to-day commitments. We are most grateful to Naomi Anderson, Dr. Larry Clein, Dr. Dawna Gilchrist, Dr. Geoffrey Hudson, Dr. Otto Rorstad, Dr. Peter Warren and Dr. Jack Williams for devoting the entire two days to judge the event. Carolyn Taylor managed the website, ensured that all the administrative details were very smoothly taken care of and spent many hours and considerable effort of assembling the Proceedings itself. Student volunteers Melanie Marsh, Agnieszka Wojciechowski, Ann Wormsbecker and Susan Poelman organized billets and social events.

The event and the publication of the Proceedings would not be possible without substantial financial support the Alberta Medical Foundation, the Hannah Institute, and the Faculty of Medicine at The University of Calgary to whom we are very grateful.

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# *Notes*

# A TALE OF TWO '*PHILOSOPHES*'

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## ABSTRACT

The historical period known as the Enlightenment is characterized by the belief of progress through reason, instantly recognizable as a fundamental tenet of the practice of medicine today. Indeed, it was a time that witnessed a significant change in attitude toward the healing profession; though bleeding and the administration of toxic medicines remained prevalent, physicians began to develop a concept of a specific disease with a unique cause and to place increasing emphasis on symptomatic observation in diagnosis. Although advances such as the creation of scientific journals and the rise of public health were beginning to take shape, these and other improvements of the period were to demonstrate effectiveness mostly in the future.

A primary feature of the Enlightenment and its emphasis on rational thought was the rise to prominence of the “philosophes”, or leading thinkers of the time. Of these, the two arguably most influential and widely read today are Voltaire and Jean-Jacques Rousseau. What were their thoughts on medicine in 18<sup>th</sup> century France? Voltaire once wrote: “The Art of Medicine consists in entertaining the patient while Nature cures the disease.” Rousseau, for his part, described medicine as “[A] lying art...[which] exhausts life rather than prolongs it.”

While Voltaire and Rousseau appear to share a common ambivalence toward the profession, it's important to note that the practice of medicine, like science, is founded on reason. Herein lies a fundamental difference in their belief: whereas Voltaire was considered the champion of reason, epitomizing the logical thought characteristic of the Enlightenment, one needs look no further than Rousseau's “First Discourse” to find a zealous assault on this same reason. In this way, although both felt there to be shortcomings in the medical profession, their respective thought processes reveal the disparity which kept them ideologically opposed throughout their lifetime.

*“The desire to take medicine is perhaps the greatest feature which distinguishes man from animals” (William Osler, in Cushing, 342).*

If one were to attempt to develop an “index of human progress”, a prominent feature would undoubtedly be a measure of the development of medicine and healing throughout history. The ability to repair the ills of body and mind, to extend our life span, and to relieve pain is frequently cited among mankind’s greatest achievements. Few would advocate a return to the health practices of even a couple of decades past. Just as today’s frontier of medical science is not without its ethical challenges, however, so were there opposing voices to the “progress” of human civilization during the historical period known as the "Enlightenment".

The French Enlightenment, generally considered to encompass the time between the death of Louis XIV in 1715 and the end of the French Revolution in 1799, witnessed a significant change in attitude toward the healing profession throughout its later years. Though bleeding and the administration of toxic medicines remained prevalent, and the clergy was still responsible for much of the medical care, physicians began to develop a concept of a specific disease with a unique cause and to place increasing emphasis on symptomatic observation in diagnosis. It was still a time when one would routinely find six or seven members of society’s lower class to a bed at the Hotel Dieu in Paris (McManners, 33) and when one could not speak of the medical profession, but rather the medical “professions” (Ramsay, 69); charlatans and other quacks had such a significant share of the market that anyone claiming knowledge of healing could arrive at Versailles in a time of illness and stand a reasonable chance of having his remedy employed (McManners, 26). Although advances were beginning to take shape, such as the creation of scientific journals and the rise of public health, the latter an area in which France was generally considered the world leader, these and other improvements of the period were to demonstrate effectiveness mainly in the future.

It is difficult to gauge the prevailing sentiment of the general population toward the eighteenth-century medical profession, whose progress lagged behind advances in the other sciences (Bynum, 212). In the satires of Moliere, apart from which there is little evidence of public opinion, doctors were portrayed as covering up mistakes and using jargon to trick patients into gratitude (McManners, 34). A primary feature of the Enlightenment and its emphasis on rational thought, was the rise to prominence of the *philosophes*, or leading thinkers of the time. The *Encyclopédie*, published mainly by the efforts of Denis Diderot with contributions from other *philosophes*, concluded that “it would have been more advantageous if medicine had never existed in this world” (Ramsay, 65). Of the *philosophes*, the two most influential and widely read today are arguably Voltaire and Jean-Jacques Rousseau. Much has been made of the ideological opposition that characterized their writings and correspondence; Voltaire is held up as champion of the logical thought which epitomized the Enlightenment, believing that through the application of his power of reason man can further civilization and progress toward the realization of society’s full potential, whereas Rousseau often spoke out against intellectual advancement in favor of the simplicity of life which he attributed to our distant forefathers. From this one might predict that Rousseau would not hold the medical profession in the highest of esteem. Its progress was generally synonymous with that of the arts and sciences, the denouncement of which constituted the primary objective of his much-celebrated “Discourse on the Arts and Sciences”. Indeed, in *Emile*, he described medicine as “[A] lying art...[which] exhausts life rather than prolongs it.” (22) It is somewhat more surprising that many of Voltaire’s most famous lines concerning the medical profession are also derogatory in nature; he once wrote

that “The Art of Medicine consists in entertaining the patient while Nature cures the disease.” The remaining portion of this discussion will examine some of the writings of these two great thinkers in an attempt to shed light on the relationship between their respective medical experiences, their disparate philosophical ideals, and their seemingly shared perception of eighteenth-century medicine.

Voltaire has described himself as “L’éternel malade” and once said: “Je suis né malade...aiant toujours vécu dans les souffrances” (Waldinger, 1777-8). Through his various afflictions he had much occasion for contact with the physicians of his day and became a student of medicine; forty-eight medical titles have been listed among the contents of his personal library and friends often consulted him on personal matters of medical interest. Although he always replied at length, there are reports of his running into trouble through erroneous self-treatment (1790-1). Voltaire does not seem to have been involved in most of the major medical controversies of his day, but he wrote strongly and often in support of smallpox inoculation, the most important medical controversy of the century. The first to bring the issue to the public at large, he was vehemently in favour of the procedure, though what he described as a harmless process was actually quite dangerous at that time. It appears that Voltaire was simply unaware of the risks involved and was not trying to mislead the public (1799-1803). There is no medical record of his own illness, though many attempts at identification have been made throughout the years with results ranging from simple hypochondria to sight and hearing impairment, gout, pneumonia, and genitourinary problems. Voltaire attributed his disease, which appears frequently in his correspondence, to heredity (1779).

It is generally accepted that Voltaire, for the most part, saw little worthy of praise in the physicians of the Enlightenment. In addition to his direct quotes, and the fact that in his own notebooks he ranked the activities of the medical profession alongside warfare and theologians as the principal destroyers of the human race (McManners, 34), one finds less-than-flattering portraits of the physician in his fiction. The protagonist of “Candide” falls ill in Paris and the large diamond on his finger immediately attracts two physicians (the physician driven by avarice is a common complaint of Voltaire); meanwhile, Martin, the character widely believed to come the closest to articulating Voltaire’s personal views, says: “I remember being ill on my first trip to Paris, too. I was very poor, so I had no friends or do-gooders or doctors, and I got better” (62). The leading character in “Zadig” disguises himself to Lord Ogul as a physician, and, after curing him of his illness through the use of common sense, is subject to the wrath of Ogul’s chief doctor who considers him a “danger to the medical profession” (180). As Mlle de Saint-Yves lies on her deathbed in “The Ingenu”, her family summons a doctor, but “[h]e was one of those doctors who visits his/her patients in a rush, confuse the illness he has just seen with the one he is currently attending, and blindly applies a science from which even all the mature reflection of a sound and discerning mind cannot remove the uncertainty and the dangers. In his haste to prescribe a remedy that was then in fashion, he made the illness twice as bad” (267).

Another doctor was then summoned, but “[i]nstead of assisting nature and allowing it to run its own course in a young person whose every organ was calling her back to life, this one was solely concerned to do down his colleague. The illness became fatal within two days” (268).



While the previous examples make it clear that Voltaire's faith in doctors was limited at best, it appears paradoxical to note that he consulted, at one time or another, the majority of the leading physicians of his time and was extremely devoted to his primary physician, Theodore Tronchin, to the end of his days. He describes Tronchin variously as "[son] cher Esculape" (Correspondance, 656), "the greatest doctor in Europe" ("Miscellaneous", 493), and recommended his services to anyone who would listen. He is quoted as saying that, although Moliere was right to mock them, "it is true that a good physician can save our life" (Ramsay, 66). It thus seems that, while Voltaire respected the medical profession enough to regularly consult it for advice concerning his own health - or at least those physicians he judged to be practicing according to his beliefs - he had little confidence in the system as a whole.

Voltaire's reasons for this doubt are not completely clear, but in examining his correspondence and writings, two issues present themselves. The first is that he believed in nature's ability to heal; he preached a dogma of minimal intervention in time of illness. This is likely one of the reasons he aligned himself so closely with Tronchin, one of the leading practitioners of his time who subscribed to the demand that nature take its course (McManners, 41). The idea that "Nature cures the disease" is a strong example of this belief that, above all, medicine should not interfere with the normal course of nature (Waldinger 1791). Support can also be found in "The Ingenu", in which Mlle de Saint-Yves's second doctor intervenes "[i]nstead of assisting nature and allowing it to run its own course in a young person whose every organ was calling her back to life" (269), thus precipitating a turn for the worse in the patient's condition. The second issue evident in Voltaire's writing is that his own recipe for good health is abstinence (Waldinger, 1788), moderation, and exercise; in such a scheme nature can be used to its fullest potential and the need to consult physicians is markedly reduced. In the example involving Lord Ogul, Zadig tells him that his health has improved because he has been "moderate in [his] habits" and gives him the following advice: "With moderation and exercise one will always be healthy..." (180). The fact that the incumbent physician considers Zadig to be a "danger to the medical profession" appears to indicate the degree of confidence Voltaire has that the contemporary medical establishment will respond positively to what is clearly sound reasoning.

Rousseau, like his fellow *philosophe*, also experienced a lifelong struggle with illness that appears to have been congenital; as he wrote in his Confessions, "I was almost born dead, and they had little hope of saving me. I brought with me the seed of a disorder which has grown stronger with the years, and now gives me only occasional intervals of relief in which to suffer more painfully in some other way" (Starobinski, 365). As was the case with Voltaire there is no evidence aside from his own declarations to support his claims, but various attempts have been made throughout history to pinpoint a diagnosis. Rousseau seems to focus mostly on his urinary tract, complaining frequently of a problem with retention, which regular probing failed to alleviate. A list of diagnoses suggested for his ailments provides a good indication of what was fashionable in medicine at different times over the past two hundred years, with many of the conditions having long been rendered obsolete by more recent advances. Those which survive today and have been attributed to Rousseau based on his urinary symptoms include steadily worsening uremia, nephritis, and urinary neuropathy. An autopsy performed after his death, albeit with the techniques

available at the time, revealed nothing abnormal (Starobinski, 376). It is generally accepted that he became paranoid (some would say reaching the edge of his sanity and others crossing it) near the end of his life, with the adverse reactions to the publication of Emile and the Social Contract resulting in his needing to flee Paris and being subject to arrest in Geneva. He began to suspect all those around him of conspiracy theories. This led several people to propose that much of his illness may have been psychosomatic in nature, due either to his repeated probing or innate hypochondria, or psychiatric, due to schizophrenia or depression. (Starobinski, 369).

There is nothing to document that Rousseau had the contact that Voltaire enjoyed with the leading medical experts of his day; he once wrote in a letter to Voltaire: “[I]f your body or your heart suffers you have Tronchin for doctor and friend” while going on to say that he himself lives out his existence “obscure, poor, and tormented by an incurable ailment” (Besterman, 398). Though he anxiously requested assistance early in life from the medical profession and even travelled to Montpellier for an appointment, he ultimately dismissed all his doctors (Starobinski, 366). Like Voltaire, whenever references to medicine appear in his writings, they are almost invariably of a derogatory nature. Whereas Voltaire speaks frequently of the “uselessness” of medicine, however, he rarely if ever provides accounts of where it has failed him personally. While discussing his urinary problems in a letter, Rousseau relates the following of his encounters with the medical establishment: “The suffering parts must be affected in an extraordinary way, because everything that has been done by the most skilled and learned artists for the past twenty years to relieve my suffering has done nothing but irritate it.” He also says that “[b]aths, diuretics, and all the other remedies that usually bring relief in cases of this kind have never done anything but aggravate mine; bleeding has never brought the slightest relief. The physicians and surgeons have never done anything but reason about my case in a vague way intended more to console than to enlighten me. Unable to heal the body, they have tried to heal the spirit. Their treatments have done no good for either. I have lived far more peacefully since I made up my mind to do without their services” (Starobinski, 372-373).

It is no wonder, then, that he had little faith in the ability of physicians to truly heal. In Emile, which begins as a treatise on education, he claims that doctors “infect us with very deadly diseases, cowardice, timidity, credulity, the fear of death” and “against one life saved by the doctors you must set a hundred slain”; medicine “is fatal to mankind” (21-2). He cites his own experience with illness as evidence of his authority: “I have tried both [trusting in doctors and living for himself without their advice], so I think I have a better right than most to draw my own conclusions” (23). In his “Discourse on Inequality”, he wonders “whether there is any solid observation from which one might conclude that in countries where this art is most neglected, the average life of man is shorter than in those where it is cultivated with the greatest care” (The First and Second Discourses, 109). From this series it can be seen that Rousseau takes the dangers of medicine one step further than Voltaire; in addition to being ineffective and a waste of time and money with the potential to kill a patient who might otherwise recover if left to the natural course of his or her illness, he states that medicine is harmful to the core values of society because it creates individuals lacking in fundamental virtue and courage. This is a common theme throughout Rousseau’s work, most concentrated in his “Discourse on the Arts and Sciences”, in which he generally declares that

“...[O]ur souls have been corrupted in proportion to the advancement of our sciences and arts toward perfection” (39). Perhaps the most significant reason that medicine is not to be trusted is that it inhibits the innate healing processes of nature, a concept with which Voltaire would likely agree in principle; the way they go about illustrating this concept in their writings, however, is markedly different. Rousseau uses a hypothetical “primitive man” as a reference point for humanity in its purest and most ideal state, whereas Voltaire champions the developments of the arts and sciences and cosmopolitan society in general. Rousseau’s “Discourse on Inequality” is largely devoted to a detailed description of this primitive man and his many virtues in contrast to the evils of the contemporary society humanity has created; Voltaire was not at all impressed with this viewpoint and wrote to Rousseau in response: “I have received, sir, your new book against the human race...no one has ever been so witty as you are in trying to turn us into brutes: to read your book makes one long to go on all fours” (“Miscellaneous”, 493). Voltaire’s story “The Ingenu”, about a savage who travels from Canada and becomes integrated into European society, is also widely believed to be in large part a satire of this aspect of Rousseau’s thought. In accordance with this philosophy, Rousseau saw illness as the fault of mankind; he points to the fact that, of man’s “natural infirmities”, which he lists as infancy, old age, and illness, the first two are common to all animals but the last belongs principally to civilized man. In light of this, “man in the state of nature hardly had need of remedies, still less of doctors” (First and Second Discourses, 110). Hunters provide evidence of wild animals whose extensive wounds have healed very well naturally without having been “tormented with incisions, poisoned with drugs, or weakened with fasting.” He finishes by saying “[I]t is still certain that if a sick savage abandoned to himself has nothing to hope for except from nature, in return he has nothing to fear except from his illness, which often renders his situation preferable to ours” (111). In spite of this crucial difference of opinion with respect to social progress, Rousseau’s guidelines for healthy living are remarkably similar to those of Voltaire. In Emile, he states that “[h]ygiene is the only useful part of medicine, and hygiene is rather a virtue than a science. Temperance and industry are man’s true remedies...” and observes that “[n]early all the instances of long life are to be found among the men who have taken most exercise...” (23) but again takes it one step further by concluding in the “Discourse on Inequality” that failure to follow these principles results in poor health attributable to no other cause than man himself (First and Second Discourses, 109-10). Rousseau’s confidence in nature even extended to smallpox inoculation; he was not very involved in the debate surrounding the issue, but does make reference to it in Emile. By no means taking a definitive stance, he is careful to make it clear that he does not question the medical efficacy of the procedure. Rather, he would simply prefer to “let nature inoculate [his pupil] herself” as “she will choose the occasion better than we.” In the end, allowing nature to choose based on time and circumstance “[keeps] him out of the doctor’s hands, which is better” (96).

There is greater evidence that Rousseau had an effect on the medical profession than can be found for Voltaire. The former spoke out in support of artisans who toiled in poorly ventilated work environments, resulting in a letter written to the Royal Society of Medicine encouraging “natural” conditions of work with free currents of circulating air (McManners, 53-4). In one of his many eulogies delivered for a physician who had passed on, Vicq d’Azyr, perpetual secretary for the Societe Royale de Medecine, directly invoked Rousseau’s two “Discourses” as evidence for the innovative rejuvenation of the medical ethic and the

egalitarian hope that one could rise in the profession as a result of one's culture. According to Daniel Roche, during the final two decades of the Ancien Regime, the Societe "served as a catalyst for a demand for equitable promotion" (Roche, 84). Rousseau was also one of the first, in *Emile*, to lend widespread appeal to the concept of breast-feeding. Although impressive evidence has been provided that children who were nursed by their own mothers stood a better chance of surviving than those who were wet-nursed or fed by hand (Bynum, 248), Rousseau's appeal to family affection and duty rather than statistics of differential mortality proved effective. Thus, in this instance, one finds that Rousseau's supreme confidence in nature is synonymous with the advancement of human knowledge.

Voltaire and Rousseau, two philosophers who were opposed in many aspects of fundamental thought, were clearly in agreement about one thing: good health is the foundation of all else. Voltaire considered good health and a strong constitution to be essential prerequisites to happiness and personal satisfaction in life (Waldinger, 1778), and Rousseau wonders in his "Discourse on Inequality": "Now I would really like someone to explain to me what type of misery there can be for a free being whose heart is at peace and whose body is healthy?" (*First and Second Discourses*, 127) If one subscribes to the theory that there were two prevailing attitudes toward medicine in general during the Enlightenment, that of "expectant medicine" in which one waited for the healing power of Nature to do its work, and that of "active medicine", in which one rapidly and energetically intervened (Rey, 125), Voltaire and Rousseau can both be placed firmly on the side of the former. It is certainly unjust to compare the pharmaceutical interventions of their time with those of Osler's, but it is nonetheless likely that both would disagree with aspects of his statement concerning the greatest distinguishing feature of man from animals; the truly enlightened individual would prefer the course of nature to medical intervention. Voltaire would probably praise the fact that humanity has developed medicines and can rationally decide when and when not to employ their use; as such, the concept of medicine as superior to the ignorance of animals and savages would indeed be a positive distinguishing feature of mankind. Rousseau, in contrast, would consider the mere concept of pharmacological medicine to be contrary to humanity's greater good. Its invention is typical of the way that scientific advancement so commonly comes about – from vice, specifically in this case an inability to face illness with courage. It is the fear of death and suffering that lead mankind to seek refuge in medical progress, stripping humanity of its innate valor in the process. As he says in *Emile*: "...[I]t is the art of nature. When a beast is ill, it keeps quiet and suffers in silence..." (22). Rousseau may in fact agree with Osler's statement as it stands but would no doubt argue that the animal is superior to the man in terms of attitude toward healing and would lament it as a sorry pronouncement on the state of mankind.

The disparity of opinion displayed by Voltaire and Rousseau with respect to Osler's statement, and to the progress of medicine in general, is reflective of the fundamental Enlightenment issue of human progress through reason, which, although he did not deem it alone to be sufficient, Voltaire championed and Rousseau denounced. The shortcomings Rousseau finds in the medical profession are largely derived from the fact that it is a human societal construct; as he says in the opening lines of *Emile*: "God makes all things good; man meddles with them and they become evil." In "meddling" with nature and healing, man has corrupted a system which functions extremely well for animals, as it did, presumably, for

primitive man: "...[T]he human race would have perished long ago if its preservation had depended only on the reasonings of its members" (First and Second Discourses, 133). Its weaknesses as Voltaire perceives them, however, are due in no small part to a lack of inherent reason; he has said that he had great respect for the medical profession, but that one could not trust it completely as it was based too much on guesswork. He saw medicine as dangerous because it depended too heavily on conditions the patient did not control, such as the knowledge of doctors (Waldinger, 1791). This lack of comfort with things he did not understand is in stark contrast to Rousseau, who was most content when in the hands of nature as man in his purest original form must have been.

It is clear that the different philosophical ideals of these two men influenced their perception of and attitudes toward the medical profession of their day. It is difficult to predict how they would react to the practice of medicine today; reforms to the hospital system really began in earnest in 1774 (McManners, 54), at which point both Voltaire and Rousseau were near the end of their lives, and it is widely believed that "our type of medicine" can be traced back to the Revolutionary Paris of the 1790's (Bynum, 211). Robert Forster and Orest Ranum tell the story in the introduction to their book Medicine and Society in France of a distinguished historian of medicine who was asked the following question one day by a student: "At what time did it become statistically safer and better to call a doctor to seek health care than not to call one?" The historian reflected a moment and replied, "About 1925" (ix). Although their reasoning was not without its differences, it appears these two *philosophes* correctly assessed the odds of their time.

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# **WILL 'THE SIMPSONS' MAKE ME A BETTER PHYSICIAN: AN EXAMINATION OF CURRENT AND CLASSICAL MEDICAL CRITICISM**

By

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## **ABSTRACT**

The accolade bestowed upon physicians who seemingly perform daily "miracles" tends to insulate this noble profession from criticism. The layman can feel too inadequately informed to criticise the medical profession, while the physician is often unable to think introspectively. A recognition of the personal flaws and pitfalls associated with the practice of medicine is, however, vital in a society where these unaddressed criticisms damage the patient-practitioner relationship. Although most television medical programs perpetuate the myth of the perfect doctor, the comedy "The Simpsons" puts the flaws of the medical profession under the microscope. It presents physician characters who defy the very Hippocratic Oath whose principles they are supposed to have embraced in order to enter the profession. One physician character is a quack who greedily chose the profession for money, status and perks. Another abuses his power with unorthodox experimentation upon hapless individuals who trust his professional opinion. Another character is aloof and inconsiderate of his patient's plight, being unlikely to ever suffer true hardship. These criticisms are not unique to "The Simpsons" and the censure of physicians is not a novel endeavour. "The Simpsons" continues a classic of criticism of the medical profession present in art and literature for centuries. George Bernard Shaw's play "The Doctor's Dilemma" portrays how physicians undertake the resolution of an ethical dilemma. Each physician character is designed to caricature a set of personal flaws, as in "The Simpsons". Shaw was notoriously distrustful of physicians due to his own personal experiences and used this medium to vilify the profession. Other authors and artists have undertaken the task of medical faultfinding and offer similar criticisms. By examining these criticisms, physicians and aspiring physicians may recognize their own inherent faults, even amidst the praise to which they are so often accustomed.

An effective patient-practitioner relationship is of utmost importance to most physicians. This relationship aids or impairs therapeutics, depending on the quality of the relationship. The Canadian Medical Association (CMA) outlines some of the characteristics necessary for an effective patient-practitioner relationship.<sup>8</sup> These include "mutual trust", "respect", "sensitivity", "understanding", "open communication", "privacy", "confidentiality" and "competence" among other traits.<sup>8</sup> However it is a matter for speculation whether these

characteristics are present in most therapeutic relationships. An indirect measure of how the public feels about their relationships with physicians may be through the media.

Much of the popular media perpetuates a myth that depicts the physician as a near flawless character. Some popular representations of physicians, however, portray their imperfections. 'The Simpsons' is a television comedy that puts the flaws of the physician under the microscope. 'The Simpsons' is a somewhat subversive program that portrays its characters as caricatures. Its popularity and influence are substantial. During the 1999-2000 season, an estimated 14.4 million viewers watched this series every week, with millions more watching syndicated reruns. TIME magazine called 'The Simpsons' the century's best television show. Its popularity may partially be due its ability to parody popular culture and many professions and personalities. Its popularity may also be due to the fact that the average layperson can feel inadequately educated or confident to criticize physicians. 'The Simpsons' is able to do it for them. How does 'The Simpsons' portray physicians? Rarely too favorably.

One of the physician characters on the program is Dr. Nick Riviera. He is quite obviously a quack who greedily chose the profession for the money, status and perks. Dr. Nick (as he is affectionately known) represents those physicians who have questionable competence and honesty. His qualifications include attendance at 'Club Med School' and certification as a 'Female Body Inspector'.<sup>6</sup> No doubt, the writers for 'The Simpsons' intended to suggest that there are practicing physicians who attend disreputable medical schools and some who use their degrees for unsavory means! The writers continue to challenge his competence when Dr. Nick attempts to recall his anatomy training:

*The knee bones connected to the something,  
The something's connected to the red thing,  
The red thing's connected to my wrist watch –  
Uh oh.*<sup>9</sup>

Even still, he claims to be able to perform any operation for only \$129.95. His capacity as a physician is placed further in doubt when he recommends that an already obese character, Homer Simpson, is 'dangerously underweight'. In order for Homer to gain the much needed weight, he suggests 'Instead of making sandwiches with bread, use Poptarts, instead of chewing gum, chew bacon.'<sup>6</sup> Dr. Nick's capabilities are certainly suspect, and do little to earn the patient's respect.

Dr. Nick also represents those physicians who have undertaken the practice of medicine for the perks. In one scene he recounts how, while at a party, he suggests to a nubile young lady 'Baby, I can prescribe anything I want!'.<sup>6</sup> In order to get to work faster, Dr. Nick uses the car-pool lane by placing cadavers in the passenger seats. These and other acts display how he uses his status for ill gain.

Finally, Dr. Nick's dishonesty is shown when he falsely testifies about Bart Simpson's injuries due to an accident – 'Just look at the x-rays! You see that dark spot there? Whiplash. And this smudge here that looks like my fingerprint? That's trauma!'<sup>6</sup> A criticism of both the legal and medical professions is that, in court, the word of a physician is taken with little



question and that physicians seem able to evade successful prosecution.<sup>10</sup> It is amazing that Dr. Nick is still able to practice medicine after the numerous violations of the patient-practitioner relationship and the law. Perhaps this is intended to ridicule the self-governed physician discipline committees.

The next physician character is Dr. Julius Hibbert. Dr. Hibbert is a paternalistic doctor who lives in the lap of luxury, often insensitive to the needs and rights of his patients.

His insensitivity is evident as he breaks the news to Mrs. Simpson 'I'm afraid your husband is dead....APRIL FOOLS!'.<sup>9</sup> When asked how long a patient has to live he laughs and exclaims 'I'm amazed you're alive now!'.<sup>9</sup> Many physicians become callous after years of long working hours, endless patients and other frustrations. Dr. Hibbert's insensitivity may simply arise from the fact that he seems to never have hardship of his own. He always sports the latest fashions and he and his family live a life of seeming excess with boats, fast cars and other expensive diversions. In fact, his competence is also called into question when he is reported to have left the keys to his luxury car inside a surgical patient. Leaving sponges inside a patient after surgery is a reason why sponges are now made with radioopaque materials!

Dr. Hibbert is judgmental as well. When Marge Simpson approaches him about her pregnancy out of wedlock, Dr. Hibbert hands her a pamphlet with the title 'So you've ruined your life'.<sup>9</sup> Therapeutic approaches such as these show little respect for his patients and likely do little to build a solid relationship with his patients.

It appears that Dr. Hibbert shows little respect for the individual rights of the patient when he breaks all rules of informed consent. 'While we were setting your broken bones and putting your blood back in, we helped ourselves to a kidney.'<sup>9</sup> Dr. Hibbert's paternalistic attitude represents the physician that many medical students and physicians consider to be of the 'old school' of medicine. However, an introspective look at their own practices may reveal similarities to Dr. Hibbert.

Three psychiatrists have made appearances on 'The Simpsons', although their roles have been relatively small. Dr. Marvin Monroe represents those physicians who make outlandish claims and experiment on hapless patients. He specialized in family therapy, and advertised on television making claims that he could guarantee restoration of family bliss. The disappointment of the Simpson family when his unorthodox methods failed was hardly a surprise. Not even with an experimental electro-shock aversion therapy was he able to deliver the guaranteed bliss. Historically, psychiatrists have dealt with the stigma of fear due to their power to commit patients to asylums where mysterious, experimental and, at times, diabolical treatments might be performed.<sup>6</sup>

Another psychiatrist character, Dr. Foster, experimented with the life of Ned Flanders, the Simpsons' neighbor. As a child Ned was unruly and so Dr. Foster employed an unorthodox 'University of Minnesota Spankological Protocol' that consisted of eight straight months of pure spanking. Not surprisingly, Ned bears the scars of this 'therapy' to this current day.<sup>6</sup>

Finally, Dr. Zweig represents the physician who has more concern for money than for a patient's progress or privacy. When Mrs. Simpson is close to a breakthrough, Dr. Zweig responds:

*'Er, this may not be the best time to bring this up but, uh, your last check bounced.'*  
*'Wait, I'm remembering something'*  
*'Yes, there's still the matter of -'*<sup>9</sup>

A preoccupation with the fee is not a novel criticism of physicians.

Whether a psychiatrist truly devotes their attention to the patient or will keep the patient's private thoughts and experience confidential can be a concern to many patients. When counseling Mrs. Simpson, Dr. Zweig allows a window washer ready view of her entire office on a regular basis.<sup>9</sup> This would make any patient dealing with sensitive psychological issues uncomfortable.

It seems as though most of the characteristics that the CMA (and the Hippocratic Oath<sup>4</sup>) views as important for an effective therapeutic relationship are rarely apparent in these parodied characters. These depictions of physicians may not represent all physicians, but patients, medical students and doctors have all had experiences with physicians who are indeed similar to these characters.

It is evident how the writers of 'The Simpsons' feel about physicians. However, these criticisms are not novel. For centuries, writers and artists have taken liberty with the portrayal of physicians. Their criticisms seem very similar to those of 'The Simpsons'. They appear to harbor distrust towards the physician and depict them with similar contempt.

More than two thousand years ago, Plato questioned the efficacy of the medicine of his age: 'By doing nothing, the doctor will, Do more good than by using his (s)kill'.<sup>2</sup> Whether a physician does more harm than good is a criticism that is common even now. This seems to violate the Hippocratic Oath sworn to enter the profession - "First do no harm".

At a time when there was a heavy emphasis on excrement-based remedies, Christopher of Mitylene (11<sup>th</sup> Century), wrote of physicians:

*You think you're so fine,  
You think you are It.  
Your pay is from urine,  
Your fame is from shit.*<sup>2</sup>

This passage not only criticizes physicians for their inflated craniums, but also states that the reason for their godlike attitudes lies in their questionable techniques.

The physician who often purports to be humanitarian, yet collects a hefty fee from an ill patient has been a common source of contention. In 1587 a series of engravings by an anonymous Dutch artist studying under Hendrik Goltzius were produced.<sup>1</sup> These depicted

the physician as a god when the patient was near death, an angel when the patient was nearing health, a mere mortal as the patient was healed and a devil when he collects his pay. These engravings suggest that a physician should collect their fee within the first two stages in order to save face with the patient. While it is not unreasonable for physicians to collect their fees, the inflated costs of performing some types of medicine and their lives of seeming luxury tend to alienate the doctor from the patient.

Moliere states that a benefit of the profession is not only that the fees are costly but that “payment comes whether we kill or cure” in the play ‘The Doctor in Spite of Himself’ (1666).<sup>5</sup> He suggests that no matter how competent (or incompetent), using whatever therapeutic methods accepted at that time, the doctor still gets payment. In this play, he further claims that the guise of the physician allows any number of abuses of power. As well as collecting his fee after a patient’s death, the physician is also said to be rarely held culpable for his patient’s demise, even when he has done more harm than good.

Sexual abuse of patients is a reprehensible offense that Moliere describes in the play. When presented with a well-endowed, attractive nursemaid the lead physician character states that ‘I must make test of Nurse’s milk’.<sup>5</sup> He continues to make advances claiming that the nurse is nearly heretical in doubting his methods. The Hippocratic Oath unquestionably condemns this act,<sup>4</sup> however, its occurrence is regularly reported in the press and at medical disciplinary hearings.

More recently, George Bernard Shaw held the attitudes of the physician in contempt and shared his reservations of medical practice in the play ‘The Doctor’s Dilemma’ (1911).<sup>7</sup> In it he designs a number of physician characters who caricature the physician of the day. His preface explaining his disdain for doctors claims that physicians falsely represent the science behind their therapeutics, make grandiose claims and risk the health of their patients for their own fame. As well, he feels that many physicians live a sheltered life of wealth and health and so are unable to sympathize with their patients.

In a scene when the physicians are discussing their ‘triumphs’ and theories, one physician states that when administering a therapy with little scientific merit, ‘instead of curing her, it rotted her arm right off...I took my chance of it’. His physician colleague replies ‘She did you mean.’<sup>7</sup> The gallant physician sacrificed little but seems ignorant of his patient’s plight. So ignorant of her situation that he further states ‘she makes a good living out of that arm now by showing it at medical lectures.’<sup>7</sup>

These physicians continue to discuss how one has become so wealthy. He states that his secret to wealth lies in two words –‘Cure Guaranteed’, suggesting that this is what ‘everybody wants from a doctor’. He is however little aware of the other attributes that the CMA describes.

Another colleague, a surgeon, suggests that the secret to his success lies in his discovery of an internal appendage that he has named the ‘nuciform sac’. He claims that this sac is the root of most illness, leading to ‘blood poisoning’.<sup>7</sup> The only cure for this ailment is to remove the nuciform sac, a fashionable surgery, thus keeping this surgeon in ample business.

Shaw suggests that the science, or fraudulence, behind his claims and actions have much in common with today's practices of appendectomy, tonsillectomy and uvulectomy.<sup>7</sup>

Finally, Shaw shows his further disapproval of a physician's ability to relate to a patient as the doctor claims 'I've never [been sick] in my life. That's what enables me to sympathize with my patients.'<sup>7</sup> This type of sympathy shows the lack of understanding by this physician. Shaw continues with his parodies throughout his play, making criticisms of doctors that are common at the present time.

The criticisms of physicians have changed little over the past two centuries. Artists and writers have been condemned the acts of physicians, often with greater ease than the average layman. Each artist has depicted the flaws of physicians as they are viewed by the public. The Simpsons presents this parodied view of physicians and depicts a number of physician characters, each with their own set of flaws. These flaws are evident in medical scandals, lawsuits and tribunals, and even in our own personal experiences. Although many physicians will be free of these faults, it is the reputations of these infamous physicians that affect the view of the rest of the profession.<sup>3</sup> These flaws impair the efficacy of the patient-practitioner relationship and violate many of the characteristics necessary in this therapeutic relationship.

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# FOXGLOVES, WOODY BEANS, AND AN OLD HAG: NOTHING NEW UNDER THE SUN

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## ABSTRACT

**The contribution of plants to the development of medicines used to treat illness has been unparalleled, and dates back to prehistoric times. In fact, pollen and flower fragments from several medicinal plants have been found in Neanderthal tombs in Iraq as early as 60,000 years ago. This traditional relationship between medicine and botany has persisted over the centuries. In fact, approximately 50% of our modern medicines have at least one ingredient of natural plant origin. Three interesting discoveries over the past 300 years will be reviewed: *digitalis purpurea*, from the foxglove plant (1780), *physostigma venenosum*, from the calabar bean (1860), and paclitaxel, from the Pacific yew tree (1960). The mechanisms of each of these drugs are unique and have provided significant advances in the fields of cardiology, ophthalmology, and oncology. Undoubtedly, continued research in the botanical world will only enhance our knowledge and scope of the natural compounds that exist and can be used to treat a broad spectrum of disease entities.**

## Introduction

Throughout history, botany and medicine have been closely linked. Traditional witch-doctors were often accomplished botanists, and there is evidence of use of plants for medicinal purposes dating back 60,000 years to Neanderthal tombs in Iraq where pollen and flower fragments have been found. In addition, the opium poppy was cultivated in Mesopotamia approximately 5400 years ago, and has been used medicinally ever since. The legacy of the early partnership developed between botany and medicine remains strong today. In fact, approximately half of all modern medicines have at least one ingredient of natural origin. It is imperative then that we recognize the “roots” of our development as a medical community, and acknowledge that the answers to some of the most perplexing diseases may be waiting to be discovered among the species of the plant kingdom.

There have been hundreds of plants over the centuries that have shaped medical practice. For the purposes of this review, I will focus on three significant contributions of plants in medicine spanning three centuries: *digitalis purpurea*, or the foxglove plant (1700's), *physostigma venenosum*, or the calabar bean (1800's), and paclitaxel, or the Pacific yew tree (1900's).

## 1) Digitalis Purpurea—The Foxglove Plant



Digitalis Purpurea (digitoxin/digitalis) was originally discovered in the 16th century by Leonard Fuchs, who named the plant “digitalis”. Unfortunately, due to severe toxicity and the deaths of some patients, digitoxin was rejected and forgotten until 1741, when it was rediscovered by William Withering. Dr. Withering went to medical school in Edinburgh where he showed strong interests in botany, chemistry, and mineralogy. After medical school he served in an infirmary for the poor in Stafford, a small town in England and became a “country doctor”. One of his patients, an old woman dying of dropsy, or edema, who he expected would die quickly instead recovered miraculously. Withering found she had taken a mixture of twenty herbs, and realized the active ingredient was the flowering foxglove. For the next 10 years, Withering collected data on effects of the foxglove plant in 163 patients. The observations he made regarding toxicity, indications, and dosing were published after his death in a book called, “An account of the foxglove and some of its medicinal uses with practical remarks on dropsy and other diseases”. Some of the side effects of digitalis he accurately described as, “*sickness, vomiting, purging, giddiness, confused vision, objects appearing green & yellow; increased secretion of urine, slow pulse (even as slow as 35 in a minute), cold sweats, convulsions, syncope, death*”. At first he thought these effects were necessary to ensure the diuretic function, but later he wrote, “*let it be continued until it either acts on the kidneys, the stomach, the pulse, or the bowels; let it be stopped at the first appearance of any of these*”. Since its discovery, digitalis has been the centre of a debate as to whether its toxicity outweighs its benefits. Withering argued for a botanical view “*the use of foxglove is getting abroad, and it is better the world should derive some instruction, however imperfect, from my experience, than that the lives of men should be hazarded by its unguarded exhibition, or that a medicine of so much efficiency should be condemned and rejected as dangerous and unmanageable*”. Interestingly, physicians today still treat digitalis toxicity as often as they use it to treat congestive heart failure. In spite of modern knowledge of pharmacology and pharmacokinetics, toxicity remains common in patients prescribed digoxin.

Digitalis inhibits the Na-K pump, which increases intracellular Ca, resulting in enhanced contractility of myocytes, and inhibits rapid conduction via Na channels resulting in a

decreased heart rate. Digitalis is primarily used today in patients with atrial fibrillation and cardiac failure. Patients treated with digitalis are closely monitored for cardiac toxicity (prolonged QT wave on ECG). It is remarkable how true the Withering's observations from over 200 years ago remain today,

*"The Foxgloves leaves with caution given  
Another proof of favouring heaven  
Will happily display  
The rapid pulse it can abate  
The hectic flush can moderate  
And, blest by Him whose will is fate,  
May give a lengthen'd day."*



*Physostigma venenosum.*

## 2) *Physostigma Venenosum*—The Calabar Bean

The calabar bean grows on a woody African vine that is found along the Calabar river in the Gulf of Guinea. It is an extremely poisonous plant and was used by natives of the region to determine if criminals were guilty; if they were given the calabar bean potion and lived they were determined to be innocent. The calabar bean was first recognized by the rest of the world in 1840 when Dr. W.F. Daniell, a British medical officer in Africa, brought it to England. In 1855, Sir Robert Christison found the calabar bean had no pharmacologic activity, but deemed it appropriate for humane execution of criminals. Less than a decade later, Argyll Robertson, an ophthalmologist in Edinburgh, and student of Dr. Christison, discovered by injecting extracts of the calabar bean into his own eye that it constricts the pupil. This important finding led to substantial research on the alkaloid obtained from the calabar bean, *Physostigma Venenosum* and the determination of its chemical properties and mechanism of action. Physostigma is an anticholinesterase, which causes accumulation of acetylcholine, and stimulation of cholinergic receptors in the central and peripheral nervous system. It has numerous neurologic effects including: rapid constriction of the pupil and disturbed vision, stimulation of the smooth muscles of the intestines, slows the pulse and increases blood pressure, and depresses the central nervous system, causing muscular weakness. Physostigma has been employed for its depressant action in epilepsy, and cholera, and given hypodermically in acute tetanus. Currently physostigmine is most commonly used in glaucoma patients, but also for treating atropine intoxication, Friedreich's ataxia, Alzheimer's (although it has increased toxicity compared with other anticholinesterases), and dry mouth (stimulates minor salivary glands).

## 3) Paclitaxel –The Pacific Yew tree

The Pacific yew tree, or *Taxus brevifolia*, of the same family as *Taxus canadensis* (Christmas trees), is a slow growing tree (often between 300-500 years old) found in the west coast states from southern Alaska to northern California. Often referred to as "the old hag" of the



forest, it is usually not much taller than 35 feet and is scraggly looking. It has bright berries that are poisonous; the wood is very pliable and has been used by Native Americans for centuries to make bows, arrows, canoe paddles, clubs, spoons, and combs. The leaves were used by Native Americans to treat wounds and the bark to treat lung ailments. A legend of ancient and medieval times associated the yew powerfully with poisoning and death. According to Galen and Dioscorides, lying under the branches of the yew could lead to death. In Macbeth, it is a key ingredient of the witch's poisonous brew, “slips of yew slivered in the moon’s eclipse”. Indeed, the yew was feared for its power to kill, and was known as “The Tree of Death”.

**The Pacific yew tree**



The modern history of yew began in 1962 when a botanist and three college students were put on a task force to collect 650 random plant samples in California, Washington, and Oregon for the National Cancer Institute. In screening, an extract from the yew tree was found positive for antitumor activity in mouse leukemia life prolongation assays. In 1971 taxol was isolated by Mansukh Wani in North Carolina. It takes bark from 3-5 yew trees to obtain enough drug to treat one patient. However, because of supply limitations and difficulties with isolation and extraction of the drug from the yew tree, funding for further research was denied. Fortunately, in 1975, Taxol was again tested for antitumor activity, and this time was found to reduce tumor burden in melanoma. Further developments followed rapidly. In 1977-79 the mechanism of action was determined and studies for toxicity safety were completed. In 1983-84 early Phase I and II clinical trials in humans began. In 1989 taxol was found to be effective against ovarian cancer, and in 1993 its anti-tumor activity was shown for breast and lung cancers.

One reason for the success of Taxol as a chemotherapeutic agent is its unique mechanism of action. It causes cell death via apoptosis by stabilizing microtubules and causing cell cycle arrest in G2M of mitosis. Taxol is generally well tolerated, with minimal side effects which



include peripheral neuropathy, neutropenia, and myalgias. Currently Taxol is the largest selling chemotherapeutic agent in the world. This related not only to its unique mechanism of action, but also to its synergistic effect with other chemotherapy drugs including adriamycin, which allows it to be used in combination with other drugs against several tumors. Continuing trials in tumor types such as esophagus and head and neck cancer have produced promising preliminary results. Assuming that this success continues, taxol will be a leader in the fight against cancer. Thankfully, the future of the yew tree will not be sacrificed to keep up with the demand of this life-giving drug as synthetic production ensures adequate supply. The irony that the “Tree of Death” from ancient and medieval times is now revered as the “Tree of Life” in the 20<sup>th</sup> century proves that anything is possible when it comes to the application of plants in medicine.

### **The History of Medicine Stems from Plants!**

Many of the drugs we have today have not been “invented” or created by scientists, but exist in nature and in some cases have been used by indigenous peoples for centuries to treat illness. As a result, we are witnessing a “renaissance” of historical compounds in today’s medicine. Popularity of herbal compounds and faith in their value is on the rise. By studying the history of medicine, we have found new applications for old remedies. There is still much to be learned, and new remedies can be expected. The hopes of the future lie in the secrets of the past. We may think we are savvy and sophisticated as a civilization in the 21<sup>st</sup> century, but in truth the eloquent expression from the bible says it best, “*there is nothing new under the sun*”, Ecclesiastes 1:9.

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# NUTMEG: ONLY A SPICE?

By

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## ABSTRACT

**Nutmeg is one of the most commonly known kitchen spices, often used to improve the taste of food or to add a decorative touch to drinks. Historically, however, nutmeg has played diverse roles in medicinal preparations and recreational activities. Although many of these traditions appear to be forgotten, a variety of paradigm shifts in American society indicate that there is potential for revisiting many of these practices. For the medical community, increased nutmeg use warrants some concern, or at minimum discussion, due to the lack of knowledge about the active ingredient(s) in nutmeg and its affect on the human body. In the following article I will provide a brief description of the nutmeg tree, how it was first introduced into Europe and subsequently the America's, the historical indications for nutmeg use, and how it is being used today.**

## The Nutmeg Tree

The botanical name for the nutmeg tree is *Myristica fragrans*. It is an evergreen tree that requires hot, humid climates for optimum growth. The tree must mature for seven years before it is able to bear fruit, at which time it remains productive for over 90 years. The fruit is light yellow in color with a variety of red and green markings. When the fruit ripens, it opens to expose a red aril and a dark brown seed. The aril is harvested for Mace, the sister spice of nutmeg. The seed itself is dried and opened to remove the endosperm, which is a nutmeg.

## A Brief Nutmeg History

The nutmeg tree was originally found only on the Banda Island, the largest of the Molucca Spice Islands in Indonesia. As early as 200 BC, Romans would make the voyage from Egypt across the Indian Ocean to trade goods with the natives for supplies of black pepper, cinnamon, cloves, ginger and nutmeg. With the fall of the Roman Empire, spice use declined until it was reintroduced by the Arabs.

The Arabs were the exclusive traders of spice in the sixth century. They acted as middlemen between India, Indonesia, Africa and the Orient, supplying spice to Europe at exorbitant prices. Arab traders were secretive about their trade routes and managed to monopolize the spice trade for centuries until the European nations became anxious to capitalize on the lucrative trade.

During the Age of Exploration, a Portuguese expedition resulted in the first mapped route to India and the Spice Islands. The discovery was attributed to Vasco da Gama, who led the crew that reached Calicut, India in 1498 by travelling around the Cape of Good Hope on the Southern tip of Africa. However, the Portuguese only gained control over the spice trade for a short time.

The Dutch gained control of shipping in Europe around the sixteenth century and soon began to expand their trade into the East Indies. By the seventeenth century the Dutch grew tired of negotiating trade with the native rulers. They waged war on the Banda Island, killing and enslaving natives in order to achieve unchallenged rights to the Spice Trade. However, supremacy over the distribution of spice would still change hands again before the end of the eighteenth century.

The English chose to gain control over India on the inland, and by 1780 their position was securely established. They were then able to rival and defeat the Dutch. Once the English took control of the Spice Islands, under the name *British East India Company*, they harvested nutmeg seedlings and transported them to other colonies including: Penang, Singapore, India, Sri Lanka, the West Indies and Grenada. Making nutmeg more available and affordable around the world.

### **Medicinal Uses of Nutmeg**

While the Arab Empire was spreading spice throughout Greece, Italy, and Europe, they were also sharing their beliefs about the medicinal effects of spice. As trade grew, so did the importance of nutmeg (and other spices) for treating and preventing a variety of ailments. These included lesions of the mouth, difficulties with digestion, vomiting, dysfunction of the liver or spleen, general respiratory ailments, fevers, parasitic helminthes, scabies, eczema and removal of skin blotches.

English herbalists added additional recommendations for nutmeg use, suggesting that it could be used to improve bad breath, reduce pain of all types, prevent rheumatic pain and decrease boils. English women also believed that nutmeg could be taken to induce menses and act as an abortifacient.

With the introduction of modern pharmacy, the use of nutmeg fell out of favour in England. As a result, medicinal uses of nutmeg never became popular with American physicians, and nutmeg was in fact excluded from the 1965 edition of the United States Pharmacopoeia. This is not to say however, that this holds true in other parts of the world, or that traditional folk remedies that included nutmeg were forgotten. For example, in India nutmeg is heralded as one the most valuable of medicines according to their Ministry of Health. It is added to almost all of their remedies for both treatment and prevention of illness such as headaches, fevers, digestive complaints, pain, sedative, cough suppressant, hypnotic and relaxant.

## Recreational Uses of Nutmeg

In addition to the medicinal indications for nutmeg, there were also recreational purposes for the spice. Many of these uses date back to native Indian cultures that used nutmeg to calm nerves and appease irritable children. Arabs thought of nutmeg as a potent aphrodisiac. It was ingested to produce erotic sensations and for seduction of either sex. The use of nutmeg for this kind of recreational purpose was widely accepted in many cultures, including many countries in Europe. As a result, a variety of rituals and love potions were concocted using nutmeg as the main ingredient. English herbalists took these recommendations one step further. They prescribed nutmeg for impotence, suggesting that nutmeg oil could be ingested or rubbed on genitals to excite and maintain sexual passions.

With the variety of uses for nutmeg and rather extensive distribution and consumption of the spice, people found that ingesting large quantities could also produce intoxication. With this discovery, the recreational indications for nutmeg became less specific. Eventually, nutmeg was used or abused purely for entertainment purposes, a practice that did carry over into the Americas.

Using nutmeg as a narcotic was not a consistent practice in the Americans, trends of nutmeg use fluctuated over the years often reflecting ‘drug droughts’. People would experiment with nutmeg intoxication but preferred the alternatives, such as opium, marijuana and heroine. However, nutmeg use was consistently popular well into the 1960s with soldiers, seaman, struggling musicians and prisoners. In fact, the Malcolm X biography describes his experience with nutmeg use illustrating the climate of the time; “I first got high in Charlestown [prison] on nutmeg. My cellmate was among at least a hundred nutmeg men who, for money or cigarettes, bought from kitchen worker inmates penny matchboxes full of stolen nutmeg. I grabbed a box as though it were a pound of heavy drugs. Stirred into a glass of cold water, a penny matchbox full of nutmeg had the kick of three or four reefers”. When authorities became aware of these activities, nutmeg was banned from the kitchen of numerous state prisons but not from the general population.

## The Pharmacology of Nutmeg

The knowledge regarding the pharmacology of nutmeg is very limited. Research done in the mid 1970’s indicated that nutmeg may be beneficial in controlling diarrhea by inhibiting prostaglandin activity in the gastrointestinal tract. The chemical structure of *Myristicin*, the compound that composes ~ 70% of nutmeg, resembles that of other sympathomimetic amines. This observation led to an experiment with animals that compared *Myristicin* activity with other central monoamine oxidase (MAO) inhibitors. Researchers found that *Myristicin* had many parallel effects to other MAO inhibitors but was much less potent. This research suggests that nutmeg may have some antidepressant properties that could account for historical uses of nutmeg in calming nerves or appeasing irritable children. However, the evidence supporting this claim is weak and none of the other historical indications for nutmeg use have been explored in the scientific literature.

Nutmeg intoxication is a mystery that alludes the scientific community. Researchers have theorized that large quantities of Myristicin are responsible for the narcotic effect. However, studies using other spices that contain Myristicin, including parsley, mace and a synthetic Myristicin compound, illustrated that Myristicin alone could not explain the effects of excessive nutmeg consumption. Therefore, the current theory speculates that there is a synergistic effect created by safrol, elemicin and myristicin. These are all hydrocarbon compounds that individually are psychoactive but do not produce an effect that is nearly as potent as what is experienced during a nutmeg overdose.

Much of the scientific discussion regarding nutmeg is based on case-reports or anecdotal evidence. The minimal experimentation that has been done using nutmeg was completed in the 1960's and 1970's. These were animal trials and they are often criticized because the chemical pathways explored by this research are not similar or do not exist in humans.

### **Nutmeg Intoxication**

Although the knowledge related to how nutmeg causes intoxication is lacking, the fact that nutmeg does cause intoxication has been well documented in historical and current case reports. The narcotic effects of nutmeg can be induced with ingesting 2-15g of ground powder. Approximately 4-6 hrs after ingestion the following characteristics may be present: flushing of the skin, tachycardia, absence of salivation, excitation of the central nervous system, retained consciousness with lapses of attention, depersonalization, tactile and visual stimulation, no auditory or olfactory impairment, euphoria, intense illusions, and hallucinations. However, investigations have not revealed any abnormalities; for example ECG, temperature, serum electrolytes, renal function, liver function, urinalysis, haematology and pelvic ultrasound all yield normal test results.

The experience has been compared to that of a mild dose of LSD with some people expressing a feeling of euphoria, while others experience paranoia and fear. Variation in the emotional response is associated with the specific setting and with the individual's original mood; this is similar to other psychoactive drugs. There is speculation that one of nutmegs most famous users is an illustration of this effect.

Michel de Nostredame (1503-1566), or Nostredamous, was a physician, astrologer and to some, a prophet. He is renowned for the strides he made in France, teaching proper sanitation and developing innovative treatment during the bubonic plague. Unfortunately, he was not able to save his wife and children who succumbed to the plague in 1538. In 1540, Nostredamous began speaking of an angelic spirit guiding him to understand the movement of the heavenly bodies in order to predict earthly events. He then recorded these predictions in the form of poetry called quatrains. Many of Nostredamous's predictions were morbid, describing death, wars and natural disasters. In order to inspire his visions, Nostredamous experimented with various hallucinogens but eventually settled on nutmeg. There has been some speculation and controversy among Nostredamous critics; some people believe that his nutmeg use came before the visions and that Nostredamous's prophecies were only products of intoxication and a reflection of his depression.

In addition to nutmegs unpredictable effects on mood, it also has some other serious drawbacks to its use. The after effects of nutmeg intoxication include up to 48 hours of intermittent hallucination, nausea, gagging, hot/cold sensations, blurred vision, headache, drowsiness, muscle weakness, ataxia, nystagmus, numbness and severe vomiting. There have been few reports of death from nutmeg overdose.

### **Nutmeg Use Today**

Nutmeg is still being used in to the present day for both medicinal and recreational purposes. In fact, many would argue that there has been an increase in nutmeg use.

An unfortunate, historical application of nutmeg that is continuing in Europe and the Americas in the present day is the use of nutmeg as an abortifacient. Recent case reports describing emergency visits identify this use of nutmeg as the initial trigger for accidental nutmeg overdose.

The number of people exploring Complimentary & Alternative Medicines (CAM) has been recently reported as greater than 34% of the population. CAM therapies are introduced by different cultures. The multicultural society in the Americas allows people to access additional, unconventional medicinal care from a variety of providers with different tools and ideologies regarding health. The perceived effectiveness and indications for nutmeg use are distinct for cultures all over the world.

CAM therapies can also be folk remedies that are being revisited in layperson and scientific literature. They reflect a new paradigm in public opinion, that herbal medicines are less toxic and more effective because they are natural and have been ‘proven’ over thousands of years. Much of the information regarding these traditional remedies is provided through ‘health food stores’, books and internet resources. An informal survey of these resources yielded the following indications for nutmeg use; digestive problems, calming nerves, rheumatic pain, muscle aches, impotence, liver disease and vomiting. However, very few of these sources of information provide dosing instructions or speculate on what one should expect as an outcome. There is also conflicting information on side effects, counter-indications, drug interactions and/or duration of use, including the use of nutmeg during pregnancy. It is likely that this information is not included because all these things are unknown. However, there is a qualifier by each of the authors ‘for additional information or if you suspect a severe side effect seek professional medical attention’.

Recreational use of nutmeg in the present day is most often for the purpose of intoxication. A case-report describing cases of nutmeg overdose show an increasing trend toward young people experimenting with the use of nutmeg to induce psychedelic and hallucinogenic effects. These cases indicate that there is a tendency toward poly-drug use; including alcohol and marijuana. The young drug using population continue to push the limits of drug use to reach the ‘forever unattainable ultimate high’, which is also illustrated by the trend to consuming larger quantities of nutmeg presumably to ensure the intoxication effect.

Access to information regarding these natural drugs is readily available. The internet contains multiple webpages that describe how to use nutmeg, how much to use, what type of nutmeg is 'best' and often provides glorified testimonials of its effect. As well, we can't forget that nutmeg is legal in any quantity and form. It is also readily available and inexpensive. A teen can get enough nutmeg for intoxication from the jar in the kitchen or from the local grocery store and the spice would cost less than \$1.35.

The medical community may have forgotten about nutmeg, but the public has not. In fact, there may be a trend toward revisiting some of these old medicines and drugs. As physicians we should be prepared for the revival of 'natural' therapies. Research that explores the risks/benefits of unconventional treatments for our patients is essential. In the case of nutmeg, we may even find that there is some rationale for this historical remedy, and there may even be potential conventional uses for the spice or its derivatives.

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# **GOITERS, FISH AND IODIZED SALT**

By

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## **ABSTRACT**

Throughout history we have endured many terrible diseases. Some are still with us and others have almost disappeared. One such success story is the treatment of Goiter. Goiters are swollen thyroid glands, protruding from the front of the neck. Symptoms range from slight swellings to large masses. These physiological disturbances were previously common in alpine regions, such as the Swiss Alps and other areas known as “Goiter Belts” which included the Great Lakes. In severe cases, cretinism has been documented, where those afflicted never mature to adulthood, and suffer a lifetime of neurological defects including mental retardation. The prevalence of this condition has decreased considerably through the widespread use of iodized salt.

At the turn of the century, the disease was common and its etiology remained evasive. Microbial infections, toxic chemicals, heritable factors and social poverty were considered plausible culprits. International conferences were organized to settle the debate. There, Goiter, the disease, was broken down into several subclasses: adenomatous, colloid, cystic, endemic and exophthalmic to name but a few.

Concurrently, advances in the field of chemistry were able to detect the concentrated levels of iodide found in thyroid glands. In 1910, using brook trout, Marine and Lenhart demonstrated that inadequate environmental exposure to iodide directly resulted in the hypertrophy of thyroid tissue. And fish from the same stalk, grown in pools with different levels of iodide showed a proportional increase in thyroid abnormalities.

Subsequent investigations confirmed that iodide enriched diets were capable of preventing and reversing thyroid enlargement in humans. Different health strategies for supplementing the diet of the general population were entertained. Iodized salt emerged as, and still is the treatment of choice utilized by most industrialized nations in the world today.

## **Introduction**

Throughout the world, and throughout history, humans and other creatures have suffered from a condition known as goiter. It has affected most civilizations, especially those located



inland or in alpine regions. Some examples of traditionally endemic regions known as goiter belts include the Andes in South America, the Himalayas, and the shores of the Great Lakes of North America (McCarrison, R. 1917). For centuries the science and the physiology governing this process remained speculative. Which factors were responsible? Contamination? Soil structure? Bacterial infections? Even the functional role of the thyroid gland has been the subject of much speculation and debate. Over the last hundred years or so, our knowledge concerning the etiology and treatment of this condition has evolved quite dramatically.

## Definition

The word goiter comes from the Latin word for throat, “guttar” and refers to an enlarged thyroid gland, which usually results in a marked deformation or swelling. Other symptoms accompanying the swollen neck: dry or puffy skin, hair-loss, obesity, tachycardia, lethargy and mental dullness.

Those afflicted are cosmetically unappealing and experience varying degrees physical discomfort. Displacement of the trachea or the esophagus can cause digestive and respiratory problems (Eberts, E. *et al* 1929). Disturbances to the nervous system, especially the recurrent laryngeal nerve can affect speaking (Crile, G. 1922). In some cases, the gland expands caudally and posterior to the sternum. These intra-thoracic goiters can affect cardiac physiology (Crile, G. 1922). When found in pregnant women it can lead to *in utero* developmental problems resulting in cretinism and mental retardation (Eberts, E. *et al* 1929).

Common, endemic or simple goiter is caused by a lack of iodine in the diet. This disease is no longer a significant problem in most countries, modern diets are supplemented with potassium iodide in table salt. In rare cases, a variety of different mechanisms including abnormalities in biosynthesis, goitrogenic compounds, carcinomas and autoimmune disease can cause thyroid abnormalities (Harrison's 2001).

Historically the condition has been associated with events that place a high level of stress on physiology: puberty, menstruation and pregnancy. Consequently the traditional prevalence is higher in women than in men. The Romans used neck measurements as a measure to determine premarital virginity (Binkley, S. 1995).

In North America the pre-iodine treatment prevalence of goiter is described by being quite high. Publications by Kimball in the early 1900s estimate in the order of 5-15% (severe goiter) and nearly 50% would have had some degree of swelling (Crile, G. 1922). As the oceans are the natural reservoir of iodine, the condition was much less prevalent in coastal populations. In these areas the food chain contained more of the element. In Canada, authors such as Barton and Shepherd indicated that the problem existed along the St. Lawrence Seaway, the Great Lakes and the western provinces - including British Columbia and Alberta (Crile, G. 1922). The condition was found in various types of domesticated animals: sheep, dogs, goats and cattle (McCarrison, R. 1917). Indeed, the problem was ubiquitous; at the turn of the century in Montreal had a goiter medical clinic with a roster of 2500 patients (Eberts E., *et al* 1929).

## **Anatomy and Physiology**

The early Greeks determined that the function of the thyroid gland was to lubricate the larynx and the pharynx - probably because it is located next to these structures. In the time of Vesalius (1543), the accepted function was that the thyroid was constructed to keep the throat warm (Binkley, S. 1995).

The gland consists of two lobes that are usually connected by an isthmus. It is situated adjacent to the trachea, to which it is loosely attached. The lobes are convex externally and concave internally. The upper poles are conical, the lower rounded. The right lobe is generally larger; it is also higher in the neck. The thyroid has a follicular architecture. Each follicle is a hollow, unicellular sphere filled with a colloidal substance. There are parafollicular cells, or C-cells mixed in with the follicles. (Ebberts, E. *et al* 1929).

The hypothalamic pituitary thyroid axis describes some of the endocrinological processes that govern metabolism. Briefly, the thyroid gland controls the basal metabolic rate (BMR), which is especially important during development. It affects the gonads in particular – both, testes and ovaries. The thyroid gland synthesizes hormones thyroxine (T4) and triiodothyronine (T3). Thyroid Stimulating Hormone (TSH) governs their production. TSH is secreted from the anterior pituitary. A negative feedback loop exists as T3 and T4 have an effect on TSH levels (Rayner, D. and Champion, B. 1995).

When Iodine levels are deficient, the body is unable to produce T4 or T3 at adequate levels, impacting metabolism. The normal physiological response is thyroid enlargement. This hypertrophy is an attempt to improve iodine scavenging from the blood. If this expansion is effective in improving the acquisition of iodine, a normal metabolic state would be expected, although some discomfort and dysfunction may result from the oversized gland putting pressure on the structures of the neck and thorax (Harrison 2001).

## **Classification**

Research increases knowledge. Ironically, as time passes, the facts rarely change, but the conclusions may. Consequently, the classification systems in the literature shift with the prevailing research trends. Traditionally, the following terms have been used to describe the common goiter: adenomatous, cystic, endemic, sporadic, juvenile, nontoxic, simple and colloidal (Crile, G. 1922).

In severe situations, where the hypertrophy was ineffective at increasing iodine levels, metabolic needs are not met and cretinism occurs. Paracelsus, a Swiss physician, working in the Alps, was the first to describe this relationship (Binkley, S. 1995).

Exophthalmic goiter, or Grave's disease, is not the result of dietary iodine levels. It is primarily an autoimmune disorder, resulting in abnormal metabolism (Rayner, D. and Champion, B. 1995).

## Fish

Marine and Lenhart demonstrated the iodine deficiency model of thyroid hyperplasia in their landmark paper, "Observations and Experiments on the So-called Thyroid Carcinoma of Brook Trout (*Salvelinus Fontinalis*) and Its Relation to Ordinary Goitre." As their experiments relied on the progress made in other investigations, it is necessary to describe the scientific discoveries being made in this era. They stepped forward following a logical progression of thought from earlier ideas (Marine, D. and Lenhart, C. 1910).

## What Happened Before?

Older cultures, such as the Greeks and the Romans, were able to describe anatomy, but were less adept with physiology. The fields of cell biology and endocrinology had to wait for chemistry and physics to develop the research tools found in our labs today (Binkley, S. 1995).

The discovery of iodine was an important event; it initiated a series of events that led to many discoveries, including goiter therapy. Bernard Courtois was the first to describe some of the physical properties of iodine, and is usually accredited with its discovery. In 1811 he observed clouds of violet vapour rising from mother liquor of seaweed ash acidified with sulfuric acid. The word iodine, is from the Greek word for violet "iodes". The vapours condensed on cold surfaces to yield dark crystals with a metallic luster. In 1813, Charles-Bernard Desormes and Nicolas Clement verified the results and concluded it was indeed a new substance. Concurrently and independently Gay Lussac established iodine as an element. He compared the properties of iodine to chlorine. In 1825, Berzelius uses the name halogen for the elements fluorine, chlorine and iodine.  
(<http://claniodine.tripod.com/facts.html>).

Different treatments have been developed and abandoned. In India, the affliction was blamed on spiritual possession and exorcisms are described in some very ancient scriptures known as Vedas (Binkley, S. 1995). Early Greeks used dried ashes of sea sponges (which would have contained high concentrations of iodine). Coindet used iodine for treating goiter for seventy-five years before Marine and Lenhart's conclusions were delivered (Binkley, S. 1995). However, nobody suspected that a lack of iodine was actually causing the problem.

In 1891, Murray and McKenzie treated patients using glycerinated thyroid extract (Crile, G. 1922). This treatment was somewhat effective but the composition of the extract was undetermined. In 1895, Baumann discovered that iodine was a normal constituent of the thyroid gland (McCarrison, R. 1917). Also, in that same year, Magnus Levy concluded that the thyroid controlled oxidative metabolism in tissues in some way (Binkley, S. 1995). Then, a year later, Halsted noticed that after a partial thyroidectomy the remaining tissue grows to compensate (Crile, G. 1922). In 1901, Oswald demonstrated that iodine was found in the colloid of the gland as well as being bound to the globulin (Crile G. 1922). The relationship between the thyroid, iodine, oxidative metabolism and hypertrophy was primed for discovery.

## **The Pennsylvania Brook Trout Experiment**

The Pennsylvania brook trout industry was crippled. An abnormal and excessive throat carcinoma was devastating the stocks of *Salvelinus fontinalis* in Shady Grove, Pennsylvania. The effects were so severe that the state was considering shutting the industry down. Marine and Lenhart were requested to head up the Pennsylvania State Fish Commission in 1909 (Marine, D. and Lenhart C. 1910).

The spread of the disease was not limited to the mountains of Pennsylvania. According to the authors, this throat carcinoma was linked to fish aquaculture – in all countries where they are artificially reared – especially salmon and trout. The fish hatchery consisted of a number of fishponds (houses) arranged in a single series following the course of a stream. A single stream supplied water to the upper six houses, and the lower five received from the same stream as the upper five and from another smaller stream. A baseline was established by examining the fish grown with the pre-experimental conditions. Marked thyroid changes were observed in all of the fish, regardless of their age and their pond location. Generally the fish with access to the freshest water displayed the least amount of thyroid growth (Marine, D. and Lenhart, C. 1910).

A number of affected fish were added to a new pond that was enriched, daily, with iodine. The flow rate, water volumes and iodide concentrations were carefully controlled. Fish were harvested daily and changes in the gland were measured and documented. By the second week of the experiment the condition had been reversed in all cases. The authors concluded: (i) The so-called carcinoma of brook trout was actually nothing more than endemic goiter, a well known condition in animals and (ii) Overfeeding, overcrowding and a limited water supply are major factors in the condition of thyroid hyperplasia. (iii) The disease could be prevented and cured by the addition of iodine containing substances to the water passing through the ponds (Marine, D. and Lenhart, C. 1910).

## **What Happened After?**

These researchers were not the first to consider the relationship between goiter and iodine. But they were the first to do so in a carefully controlled manner. Despite the evidence, critics did not abandon other theories in goiter etiology (McCarrison, R. 1917). Earlier, The Goiter Commission of France (1874) had undertaken a national survey and found half a million people suffering from goiter and 120 000 cretins (Crile, G. 1922). The researchers indicated that water quality was the primary cause of the problem. These earlier studies explain why leaders such as McCarrison insisted that goiter was the result of colon bacteria in the water supply and others including Shepherd, a Canadian, also maintained that goiter was the result of a waterborne infectious disease similar to typhoid (Binkley, S. 1995).

Another milestone on the road to curing the common goiter was passed when, in 1914, Kendal described the structure of thyroid hormone using two-dimensional crystallography. He isolated a hormone from the thyroid (T3) that contained three Iodine moieties. This was an essential piece of work as it provided a scientific explanation for the cause of the

condition – if the body did not have enough iodine, thyroxin would not be produced and metabolism would conceivably be impaired. However, many of the critics remained unconvinced. Other groups, including McCarrison, were producing alternative evidence that demonstrated water purification was an effective measure in abating the condition (McCarrison, R. 1917).

In the end, large-scale human studies produced irrefutable results needed to sway the skeptics. Kimball conducted the first human trials from 1917 –1921 (Crile, G. 1922). After obtaining the approval from the district public school superintendent in Akron, Ohio, a prophylactic treatment of iodine was administered to the local schoolchildren on a voluntary basis. The students, all girls, were given a 0.2 gm dose once a day for ten consecutive school days, twice a year, in the spring and the fall. The experimental group demonstrated an 80% reduction within six months whereas the control group only experienced a 12% reduction. Furthermore, Kimball describes his study as being flawed as the local physicians, after witnessing the effects of the treatment on their practice firsthand, started to administer iodine to some of the patients in the control group (Crile, G. 1922).

### **Iodized Salt**

Kimball's studies in Ohio caught the attention of the world. Diets around the globe were supplemented with iodine and the prevalence and incidence of the condition dropped off sharply. However, health officials, wanted to know what was the best way of administering the iodine. Many people discussed what would be the best treatment vector. It had to be cheap, effective and accessible.

### **Treatment**

This treatment could be delivered in food, in water, with salt, or injected. Others even suggested putting it inside chocolates (Ebberts, E. et al 1929). Other events were happening concurrently. As the scientists and politicians were discussing goiter treatment strategies, salt deposits were found in Michigan. Sheep farmers, in an effort to save money switched to this cheaper supply and began to feed it to their livestock. Traditionally, domesticated animals are affected by goiter; this was especially true in Michigan. But, when the farmers switched to the local salt supply, the swollen throats of the sheep began to disappear – the coarse salt contained iodine (Crile, G. 1922). Since then, this method has been the treatment of choice (Harrison's 2001).

Iodinated salt is preferred for a number of reasons (i) Salt is produced in relatively few centers ensuring quality control (ii) Individual consumption rates are consistent throughout the year and (iii) Consumption rates do not vary with social or economic status.

Not much supplementation is required. The metabolic status of the individual determines the need for iodine. Children require 100 *ug*/day, adults – 150 *ug*/day, pregnant women –175 *ug*/day, and lactating women 200 *ug*/day (Harrison's 2001). In an effort to reduce hypertension, salt consumption may be decreasing but it has not affected the incidence of goiter in North America.

## Current Prevalence

Today, the disease barely exists in industrialized nations. But in some developing countries, it remains a problem. Goiter has a worldwide prevalence over 5% (Harrisons 2001). Both economic and political factors affect production and availability.

## Conclusions

The application of the scientific method provided the knowledge necessary to prevent the thyroid condition known as goiter. The research followed a logical progression of thought and the results from experimental research were analyzed carefully. In this story, each new piece of evidence was challenged.

Marine and Lenhart were the first to conclusively demonstrate the causal relationship between iodine availability and thyroid hyperplasia. If they had not conducted this experiment, it is highly probable that others would have reached similar conclusions and reached them very quickly. Nevertheless, the results of their experiments not only saved the brook trout industry in Pennsylvania but lead to the development of a fantastic medical treatment.

Goiter levels quickly plummeted in the 1920s and 1930s after iodine was added to the diet of North Americans. The iodine and thyroxin levels in the population are passively maintained because all of the salt provided in our supermarkets is iodized. This treatment has been a success. Today, most people are no longer certain what a goiter is.

Unfortunately, the condition, with all of its morbidity, still exists in many regions of the world. Some people simply do not have access to this simple treatment.

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# MEDICAL EPONYMS: PRAISE AND CRITICISM

By

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## ABSTRACT

**Science is replete with eponyms: a term or phrase derived from a person's name. Over 9000 eponyms have been identified in medicine alone, describing diseases, syndromes, diagnostic tests and signs, instruments and anatomical parts.**

**Their use has been hotly debated. Eponyms have been criticized for not being descriptive, for memorializing the wrong people, or for being unwieldy, inconsistent or confusing.**

**However, a case can be made for the continued use and cultivation of the eponym in medical terminology. They are useful as mnemonics, as euphemisms, and as symbols for expressing complex ideas. Eponymy is also a hallowed tradition that honors discoverers and inventors, affording a measure of credit to scientists who might otherwise be forgotten.**

First of all, what is an eponym? An eponym is a term or phrase derived from a proper name. They are truly ubiquitous, both in our day-to-day lives and in more specialized areas of scholarship. Some eponyms become so fully absorbed into everyday language that they are no longer capitalized and all link between the person and the word is lost. The name is turned into a formal adjective or a derived noun or verb.

For example, the leotard: a close fitting one piece garment, named after Jules Leotard, a 19th century French trapeze artist who had been known to say "do you want to be adored by the ladies? Put on more natural garb, which does not hide your best features." To boycott: to combine in refusing social or commercial relations with a person, group or country usually as punishment or coercion. Named after Captain Charles Boycott, a 19th century English soldier whose Irish tenants shunned him for refusing to lower their rents. Shrapnel, named after General Henry Shrapnel, a British artillery officer who, in the early 1800s, developed a projectile which exploded in flight, sending out thousands of potentially deadly shell fragments.

Now, just how many eponyms are there? The Eponyms Dictionary Index lists 13,000 eponymized persons and 20,000 eponyms overall. While there are many eponyms used in popular culture such as the ones just mentioned, the majority are in the sciences. For some reason, scientists apparently feel a need for eponymous immortality. I'm sure that we can all

think of many examples of scientific eponyms...the Bunsen burner, Pascal's Principle, the Kelvin scale, rickettsia prowazeki, and Einstein's Theory of Relativity.

It does seem however, that there is particularly rich tradition of eponymy in medicine. The Illustrated Dictionary of Eponymic Syndromes and Diseases lists 9,000 entries. They describe more than just diseases and syndromes like Down Syndrome however. For instance, diagnostic tests like the Gram Stain, which helps classify bacteria by the structure of their cell wall; anatomical parts such as the fallopian tubes, otherwise known as the uterine tubes; instruments such as the Kelly clamp, a curved hemostat without teeth, originally introduced for gynecological surgery; signs such as Danforth's sign, shoulder pain on inspiration due to irritation of the diaphragm by a hemoperitoneum in ruptured ectopic pregnancies; fractures such as a Colles' fracture, a fracture of the lower end of the radius with dorsal displacement of the distal fragment; reflexes such as the Babinski, abnormal extension of the great toe and abduction of the other toes in response to plantar stimulation, indicative of pyramidal tract involvement; methods or techniques such as a Pfannenstiel, a transverse abdominal incision one inch above the pubis.

I'm sure we can all think of many, many more. And they don't just have to be named after people: characters from literature have been eponymized as illustrated by the Jeckyll-and-Hyde Syndrome, geographic names have been used such as in Lyme Disease, as well as occupation titles as with gamekeeper's thumb.

The use of eponyms in medicine has been hotly debated, both in the past and today. In fact the International Congress of Anatomy in Paris has purged eponyms from its list of acceptable anatomical names. The reasons given are that eponyms are used haphazardly, give no indication as to the type of structure involved and many times don't even accurately reflect historical discoveries. Other areas of medicine have not come down so strongly as to ban the use of eponyms, however, criticism is still levied against these terms.

Eponyms aren't descriptive. For example, Stein-Levanthal Syndrome may mean nothing to me, but I can envision what polycystic ovarian syndrome may be all about.

Eponyms can be unwieldy. Charcot-Marie-Tooth-Hoffman Syndrome is a mouthful. It is also known as neuropathic muscular atrophy, which is easier to say and also describes the condition.

Eponyms can be confusing if one person has more than one eponym. Some of these guys were very prolific! How many things did Trendelenburg describe? The gait, the position, both reverse and regular, the sign, the symptom, the test. It seems never to end!

Eponyms often memorialize the wrong person. Who should get the credit, the person who made the discovery or the person who recognized the significance of the discovery? The first person to published a paper on that topic or the person who wrote a later paper that was actually noticed?



This can lead to the next confusing aspect of eponyms: the same disease can have a number of eponymous descriptions, especially if there is debate as to who first described it. Graves' disease, Basedow's disease, and Flaiani's disease all describe the same condition.

Eponyms often have inconsistent usage. Unusual or foreign names are often spelled incorrectly: the Chvostek sign or Hirschsprung's disease come to mind. Hyphens are added willy-nilly: Austin Flint murmurs and Marcus Gunn pupils do not require a hyphen, as these are single individual's names. Chediak-Higashi syndrome needs a hyphen, as Chediak and Higashi were two different people. Debate also rages over the use of the synthetic genitive: Down described the syndrome but did not have it. Should we say Down's syndrome with apostrophe s or just plain Down syndrome?

But, despite all these criticisms, a case can be made for the continued use and cultivation of the eponym in medical terminology.

Eponyms can be a useful natural language symbol for complex ideas, and shorter than accurate descriptive names. Would you rather say Paget's disease of bone or osteodystrophia chronica deformans hypertrophica?

Eponyms can have value as euphemisms. A parent might be offended if you tell them your child has amaurotic familial idiocy, and so the name Jansky-Bielschowsky disease may be preferable.

Eponyms are neutral terms that allow a concept to evolve. The descriptive name acute lymphoblastic leukemia seemed appropriate at the time it was coined, however, it is now known that there isn't always a high white count the a leukemia implies and there isn't really a proved connection with lymphoblasts.

Last but certainly not least, eponyms enliven medical history. They honor discoverers and inventors, and afford a measure of credit, reward and recognition to scientists who might otherwise be forgotten.

Eponyms are one of the last vestiges of humanism remaining in an increasingly numeralized and computerized society. Behind every eponym is a story, the story of the clinicians, the patients and of medical science itself.

Eponymy is the most enduring and perhaps prestigious kind of recognition institutionalized in science. I'm sure we would all love to have something named after us: let me see, Mayer's sign, Mayer's disease, the Mayer procedure...however I think I have a lot of work to do before I can get to the point where I could discover or invent anything!

Perhaps I am afflicted with the Tashima Syndrome. Dr. Tashima is an American physician who facetiously described this condition in which a physician searches for a new sign, disease or condition to attach his or her name to.

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# **“IT’S ALL IN THE PALM OF YOUR HAND”**

By

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## **ABSTRACT**

**Dermatoglyphics: a term first coined by Dr. Harold Cummins in 1926. It refers dually to the science of fingerprints, and to the actual prints or dermal ridge formations. Fingerprints, like palmar creases, have long entertained the minds of men and women. In 3000 BC, the emperor of China utilized his thumbprint to seal documents; the tradition continued, and in 500 BC there is evidence that Chinese potters used their thumbprints to indicate ownership. This was true elsewhere in the eastern world as well. The Greek philosophers and physicians; however, saw the worth of the hand as a diagnostic tool. The world of dermatoglyphics faded from the history books for a period of time, until interest in the subject was revived in the late 17<sup>th</sup> century by the work of Nehemiah Grew and his contemporaries. Little was accomplished in the field over the two subsequent centuries; that all changed with the works of individuals like Sir W. Herschel, Sir F. Galton, and Harris Hawthorne Wilder. The efforts of Galton and Wilder proved that “fingerprints” are inheritable. The usefulness of ‘printing’ in the diagnosis of physical and mental illnesses; however, was not established until the 20<sup>th</sup> century. L. S. Penrose was the first to show that the number of sex chromosomes (X and Y) had a predictable and measurable effect on the ‘total ridge count’. In the early nineteen hundreds an infamous study regarding Downs Syndrome helped move dermatoglyphics from obscurity to being acceptable as a diagnostic tool. Dr. Harold Cummins predicted a genetic link based on the consistently abnormal dermatoglyphic patterns he found in Down syndrome children. His prediction was later confirmed when it was discovered these children had Trisomy 21. Dermatoglyphics were utilized in many studies from that moment forward; however, in 1980 DNA testing replaced the use of the dermatoglyphic test in twin studies, issues of paternity and in chromosome disorder research. Although the use of dermatoglyphics was short lived, there may still be room and usage for such a science in today’s world.**

“These marks are his signature, his physiological autograph, so to speak, and his autograph cannot be counterfeited, nor can he disguise it or hide it away, nor can it become illegible by the wear and the mutations of time.”

- *Pudd'nhead Wilson*  
Mark Twain

Dr. Harold Cummins, an anatomist, first coined the term dermatoglyphics in 1926. The word originates from the combination of two Greek words: *dermato* for skin and *glyphics* for carving. Dermatoglyphics refers dually to the science of fingerprints, as well as to the actual prints or dermal ridge formations. As suggested by the quotation above, fingerprints cannot be altered or hidden and nor do they change with time or as a consequence of mutilation.

After years of research and analysis it has been determined that fingerprints are formed in utero. Between the sixth and eighth weeks of gestation the volar pads form. These little ball like structures number eleven per hand and together they determine the contours of the developing fetal hand. The existence of the volar pads is short lived and they begin receding between the tenth and twelfth weeks of pregnancy. By the fifteenth week, skin ridges begin to appear taking the shape of the receding volar pads. Eight weeks later, the dermal ridges are completely formed. The formation of the dermal ridges is under the control of several genes as well as the intrauterine environment; thus even monozygotic twins can be differentiated on the basis of fingerprints alone. It is important to note that several genes are involved in the formation of these structures. Even if two individuals have the same genetic condition, the dermatoglyphic manifestations of this condition will therefore differ between them. An analogy for this would be that not all individuals with the same genetic condition present with the same signs and symptoms yet they are given the same diagnosis.

Although flexion creases are not formally included in the study of dermatoglyphics they offer valuable information the worth of which should not be ignored. Wurth, in 1937, was the first to note that flexion creases form in utero *before* the fetal hand is capable of movement. According to Penrose, flexion creases represent firmer attachment of the skin to the underlying tissues. The flexion crease encompassing the thenar muscle mass is the first to form (seventh week of gestation). The distal and proximal horizontal creases form two weeks later. Unlike dermal ridge formations, flexion creases undergo modification during the course of one's life. The medical profession has paid little attention to the formation of flexion creases; dermatoglyphic findings however have been viewed in a slightly different light.

The use of fingerprints for various purposes dates back to the year 3000 B.C., when the emperor of China used his thumbprint to seal documents. There is evidence that thumbprints continued to be utilized by the Chinese when signing deeds. As well, potters of the day made their ownership known by marking the object with their thumbprint. More recently, the significance of the number of whorls on one's hand is referenced by Chinese proverbs. The use of prints for such purposes is not mentioned. Complete records of business transactions in Babylon were inscribed on clay tablets with a fingerprint. Evidence for the use of fingerprints elsewhere in the world is lacking until much later.

Among the prominent Greek figures of the time, Plato, Aristotle, Anaxagoras, and Galen among others, stressed the importance of the hand for obtaining knowledge about a man's health and temperament. Hippocrates shared this feeling; however, unlike many others he made it a part of his practice to carefully examine the hands of all his patients. What he was checking for though is not quite clear. It is perhaps important to note that Hippocrates was the first to describe the symptoms of pneumonia; as well, he went on to describe the Hippocratic finger and Hippocratic nail. The Hippocratic finger refers to an index finger of a special shape and a nail of a 'watch-glass form'. The Hippocratic nail was determined to be associated with tuberculosis. Hippocrates must therefore have been making note of the findings in the hand and correlating them to the symptoms he saw in his patients as well as to their illnesses.

Across the Atlantic on the eastern coast of Canada a petroglyph was found near the edges of Lake Kejimikoojick in Nova Scotia. The stone carving illustrates a hand with several markings. The piece is believed to be several hundreds years old and the markings on it are believed to represent the flexion creases and/or the dermatoglyphic markings.

Although dermatoglyphic markings have entertained the minds of many individuals across the centuries, their study lacked scientific backing well into the 19<sup>th</sup> century. In 1682, Nehemiah Grew became the first individual to observe dermal ridges using more than the naked eye. He commented,

*For if any one will but take the pains, with an indifferent Glass, to survey the Palm of his Hand very well washed with a Ball; he may perceive innumerable little Ridges, of equal bigness and distance, and everywhere running parallel one with another.*

Following the work of Grew little advancement was made in this field of study as a result of a decree by the Catholic Church. It was declared that anyone suspected of practicing palmistry or the like was to be killed immediately due to a claimed satanic association. Consequently, the science went 'underground' until approximately 1871 when fingerprinting for personal identification was implemented in a district of India by Sir William Herschel (1833-1917). In 1880, Herschel and Henry Faulds independently suggested that fingerprints be used to identify criminals; however, Faulds was given credit, as he was the first to publish.

Close to the end of the nineteenth century, fingerprinting still lacked a solid scientific basis, but in 1892, Sir Francis Galton (1822-1911) was able to demonstrate that fingerprints are permanent and cannot be changed with time or through any physical means available. He later established through twin and sib studies that fingerprint patterns are in fact heritable. Galton made two additional scientific contributions in regard to dermal ridges. Firstly, he stressed that identification based on fingerprints alone could only be accomplished by looking at the minutiae of the prints and not the overall patterns. The minutiae Galton referred to are microscopic variations that exist within our prints; this is where the difference occurs between monozygotic individuals. Secondly, Galton developed a basic nomenclature

to classify the general patterns visible macroscopically. The categories included the arch, whorl and loop; these terms are still in use today.

Another important figure in the history of dermatoglyphics is Harris Hawthorne Wilder (1864- 1928). Wilder constructed numerous genograms looking at pattern types. Through his studies, and those of Galton, it was clearly established that pattern types are hereditary, leaving no doubt about the method of transmission. Many additional studies were conducted affirming the genetic basis for fingerprints. L. S. Penrose was able to show that the total ridge count varied according to the number of X and Y-chromosomes an individual possessed. Thus, genetic conditions involving the sex chromosomes, for example – Turner's syndrome, showed consistent changes in the total ridge count. With increased numbers of X chromosomes there is a predictable reduction in the total ridge count. It has been noted that Penrose strongly felt that despite the advancements in cytogenetics, 'fingerprinting' still has a role to play in the study and detection of chromosomal aberrations, especially in cases where mosaicism is suspected.

Dr. Harold Cummins is universally referred to as the father of dermatoglyphics. In the most famous of his studies, conducted in 1936, he examined several children with trisomy 21. He found consistent dermatoglyphic abnormalities that were not present among his controls; he predicted there existed a genetic anomaly that all these children possessed. His findings were confirmed in 1959 when it was determined these children had three copies of chromosome 21. This earth shattering discovery helped to move the budding science of dermatoglyphics from a place of obscurity to being acceptable as a diagnostic tool among medical personnel.

Several findings are associated with Down syndrome. In general, these children present with multiple anomalies, and are often afflicted with congenital malformations. Their hands are broad and short with thick stubby fingers. It has been noted that these children tend to have less asymmetry between their left and right hands in comparison to controls. In addition, they may only have one flexion crease on the fifth finger. The Simian line and Sydney lines are commonly present as well. The former is commonly noted as the fusion of the head and heart lines by palmists; in dermatoglyphics it is referred to as a single horizontal crease in the palm (fusion of the proximal and distal horizontal creases). The Sydney line was first described in 1968 by two Australians, Purvis-Smith and Menser. Initially it was believed that this finding was an isolated geographical anomaly. However, it was later determined that it was not, and is in fact found in a large portion of children with Down syndrome or congenital rubella in comparison to the general population. Children with trisomy 21 are noted to have two classical sets of dermatoglyphic findings. They may have ulnar loops on all ten digits. If not, they may have ulnar loops on all digits except one or both ring fingers, which have radial loops instead. (In normals, radial loops, when present in such low numbers, tend to be isolated to the index finger in almost all cases.) Ulnar loops tend to be L shaped and extremely vertically oriented – virtually a constant feature among Down children. Whorls, arches and radial loops are decreased in frequency. Other findings include a small or absent thenar pattern, and an extremely large hypothenar pattern (found in 85% trisomy 21 versus 12% controls). Consistent dermatoglyphic findings have also been found in other conditions.

In many of these instances, consistent findings among patients with a certain condition suggest a genetic basis for the condition. For conditions such as Holt-Oram syndrome, de Lange syndrome, Ehlers-Danlos, and Smith-Lemli-Opitz syndrome consistent dermatoglyphic findings were found well in advance of the genetic abnormality associated with the condition. Breast cancer, of which some forms have a genetic basis, has been associated with a higher number of whorl patterns. Other conditions with consistent dermatoglyphic abnormalities include: Alzheimer's, tuberculosis, diabetes, leprosy, schizophrenia, autism, manic-depression, mental retardation, trisomy 18, cri-du-chat syndrome, alcoholism, and leukemia (various types). Some of these conditions have known genetic anomalies; in other cases, medical science has yet to prove a genetic anomaly associated with the given condition (i.e. alcoholism).

The history of dermatoglyphics is a patchy one; for a science that only received its name during the past one hundred years it has made incredible breakthroughs. Through dermatoglyphics, Cummins predicted that Down syndrome had a genetic basis, and that was confirmed some twenty years later. Penrose has suggested that despite advances in cytogenetic techniques, dermatoglyphics still has something to offer (especially when it comes to mosaicism in association with genetic conditions).

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# **LETTING THE GENIE OUT OF THE BOTTLE: EVOLUTION OF AROMATHERAPY THROUGH THE AGES**

By

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## **ABSTRACT**

**In this paper I will trace and highlight the major points in the history of Aromatherapy development. I will explain the earliest practices and notions regarding aromatic plants and their place in human lives, and then present the modern views and applications as well.**

**Plants and plant products, especially those with pleasant smells, have been used from the earliest times for medical treatment. I will describe their use by the Egyptians, Greeks and Romans in particular. Early pharmacopoeias illustrate their use. The Arabic physicians further refined this tradition. In 1928 Rene-Maurice Gattefosse coined the name Aromatherapy for the beneficial properties conveyed by the smell of plants.**

**In the modern times Aromatherapy has enjoyed a revival, especially in France, where it has become part of the Medical School curriculum, but also in UK, Italy, and more recently in the USA and Canada. As claimed by the International Federation of Aromatherapists, aromatherapy “enhances well-being, relieves stress, and helps in the rejuvenation and regeneration of the human body”. There is still some resistance to validating and accepting such alternative therapy into the traditional Western medical canon, but the movement toward a more holistic approach to treating disease is nevertheless active. Essentially, it is an appealing form of complementary treatment, which is likely to have a high rate of compliance and many positive, healing side-effects.**





## **I. The Roots of Aromatherapy: Uncovering Faint Scents**

Aromatherapy refers to the therapeutic application of essential oils that have been extracted from natural plant matter, in order to enhance good health, equilibrium and well-being. Baths, inhalation and massage are the most widely accepted methods of aromatherapy. As a holistic herbal therapy, it claims to heal by bringing the body and the mind into harmony through integrated fulfillment of physical, emotional as well as spiritual needs (Walters C., 1998).

The use of plants for their medicinal properties dates back to prehistoric times. Primitive peoples recognized the intrinsic connection between matter and spirit and believed that disease was a result of imbalance between people, their environment, and the supernatural world (Figure 1). Plants were considered to have magical attributes because of their mood altering potential and were employed in various healing rituals to appease the spirits and combat curses (Lawless J., 1994). The scent of a flower was recognized to have the ethereal quality of being perceived with only one of five senses – the sense of smell, while evading the more commonly used sight, taste and touch. The traditional healers, and later, alchemists believed that the aroma of a plant was its soul – a vital life force, and carrier of invisible energy, so a method to capture this *essence* and to be able to release it at will was sought (Fischer-Rizzi S., 1990).

The Egyptian civilization was among the earliest to develop more highly refined knowledge of aromatic plants. They employed plants for religious, cosmetic, medicinal, as well as embalming purposes (Figure 2). In fact the survival of mummies over thousands of years can be ascribed not just to the skills of the embalmers, but also to the preservative ingredients of the aromatic oils and resins they used (Wildwood C., 1998). The Egyptian Papyrus Ebers manuscript, which was written about 1552 BC, and discovered near Thebes in 1872, records

many formulae for various preparations and their methods of use. Saffron was a condiment and perfume; galbanum was used as an incense material; eaglewood, cedar, and myrrh were employed in the embalming process; cannabis and Indian hemp were valued for their sedative and narcotic effects; mastic, frankincense and myrtle were used for fumigation purposes. Fumigation with fragrant herbs was one of the principal ways for both the remedial and preventive treatment of disease. The art of healing was very much part of the sacred dimension and therefore the symbolic meaning of cures in the context of communication with the divine was given a lot of significance (Lawless J., 1994). With the exodus of the Jewish people from Egypt to Israel around 1240 BC, the knowledge of precious gums and oils found its way into the bible and traditional life of the Hebrew culture (Figure 3). According to the Book of Exodus, the Lord transmitted to Moses the formula for a special holy ointment, which consisted of myrrh, cinnamon, calamus, cassia and olive oil. Moses anointed Aaron and his sons with it to be the priests of Israel (Exodus 30:30). Frankincense and myrrh were the treasures brought from the East as offerings to Jesus at his birth (Lawless J., 1995, Figure 4).

Other ancient cultures that have incorporated botanicals into their medical and religious practices were Mesopotamia (modern Iraq) in the Near East, Babylon and Greece.



**Figure 1.** Tribal people found that the smoke from various plants or woods had a variety of effects on their mood and state of health. (From: Walters, C: *Aromatherapy, An Illustrated Guide*, 1998)



**Figure 2.** Perfumes and cosmetics were used since ancient times to enhance appearance. (From: Lawless, J: *The Illustrated Encyclopedia of Essential Oils*, 1995)



**Figure 3.** Jewish women wore garlands of myrtle to bring good luck. It has now become a tradition to wear myrtle in bridal headdresses.  
(From: Walters, C: *Aromatherapy, An Illustrated Guide*, 1998)



**Figure 4.** The Three Kings offer frankincense to the newly born baby Jesus as a gift.  
(From: Walters, C: *Aromatherapy, An Illustrated Guide*, 1998)

## II. The Ancient Healing Power of Smell: The World of Greeks and Romans

“The best recipe for health is to apply sweet scents unto the brain.” *Alexis* [6]

Scents, either inhaled through the nose or absorbed directly by the skin, were regarded as the essential healing agents by the inhabitants of ancient Greece and Rome. Application of perfumes to the head and chest was a custom believed to promote well-being. Anointing the head with perfume when drinking wine was supposed to counteract the intoxicating effects produced by alcoholic fumes rising to one's head. Anointing the breast with perfume as well, was thought beneficial to the heart, as it would be “soothed with fragrant smells” (Classen C., et.al., 1994).

Wearing garlands around the head and the breast also served to supply healthful odours to the body. The physician Philonides compiled a tract on the medicinal values of perfumes and garlands, in which he recommended rose garlands to relieve headaches and to cool the body. According to him, myrtle garlands were stimulating and possessed the capacity to counteract drunkenness, while the wreaths of lilies had stupefying effects (Classen C., et.al., 1994).

The ancients also treated wounds with special perfumes that were applied directly to the site of injury and were held to work against the putrid odours of bodily decay (Figure 5). These floral blends – such as a lotion of wine and myrrh that was prescribed for burns, or “megallium”, the great creation of the Roman perfumer Megallus, made of balsam, rush, reed, behen nut oil, cassia and resin, which was presumed to relieve inflammation, might have indeed promoted healing by acting as germicides. The most obvious effect however,

and probably the reason why these perfumed ointments were considered so wonderful, was the fact that they could offset the foul odour emitted by the festering wounds, which no doubt contributed to the suffering of the patients as well as their attendants.



**Figure 5.** Greek soldiers took a phial of myrrh into battle; as antiseptic and anti-inflammatory agent, it was useful for cleaning and healing wounds.

(From: Walters, C: *Aromatherapy, An Illustrated Guide*, 1998)

In general, aromatic plants were widely used to cure a whole range of conditions. Rue in vinegar functioned like a kind of smelling salts and was offered to comatose patients. Epileptics were treated with the scent of thyme. The smell of pennyroyal was believed to protect the head from cold or heat and to lessen thirst – thus, a sprig of pennyroyal would be wrapped in wool and given to help sufferers from recurrent fevers. The scent of pennyroyal seeds was employed for cases of speech loss. A whiff of mint was meant to refresh the spirit, and mint was also commonly used to ease stomach aches. The aroma of the *carum capticum* plant was said to help women conceive, while the smell of anise served as a comfort measure in childbirth. In addition, anise was thought to relieve insomnia and hiccoughs through its odour and, when boiled with celery, sneezing. And lastly, fumigation with bay leaves was considered to ward off the contaminating odours of disease.

Foods, as well, were believed to emit healing scents. For instance, the fragrance of apples was held to reduce the effects of poison, whereas the odour of boiling cabbage was thought to soothe headaches (Classen C., et.al., 1994).

The ancient Greek cult of Asclepius is a fine example of how spices and herbs were seen not only as physical remedies but more importantly, as “magical charms”, that influenced the emotional states and provided a medium through which psychic healing took place. During the period from approximately 1400 to 460 BC, Asclepius, the son of Apollo and Coronis was the most prominent figure of healing. Although his character was likely founded on that of an actual healer, Asclepius became the mythical god of medicine and was worshipped by the Greeks as well as Romans in special temples, known as Asclepions, erected in his honour. The priest-physicians combined magical therapeutic methods, such as incantations, offerings and exorcisms with an empirical approach that included baths, massage and burning of incense, all of which were aimed at improving the overall psychological disposition of the patient (Lawless J., 1994).

Theophrastus, an early Greek botanist who lived around 300 B.C., wrote *Enquiry into Plants* – a treatise on odours in which he explained the early therapeutic use of various scents and their influence on the body and mind. It probably served as a manual for the Greek *Iatralypse* – medical specialists, who cured through the use of “aromatic unctions”. Bay laurel produced trance-like states; roses, costus, myrtle and coriander had aphrodisiac properties; myrrh and marjoram were used as soporific agents.

Dioscorides was another famous Greek writer who created *De Materia Medica* (around AD 100) – a large illustrated guide covering over 700 plants that were in use at the time. This work encompassed the accumulated wisdom of the Egyptians and Greeks, listing detailed recipes and discussing special properties of all their components.

Hippocrates, the son of an Asclepian priest-physician was the first to separate medicine from priestcraft and develop a new theory of disease based on the four elements or humours. Rather than ascribing disease to the possession with evil spirits, he explained it as a state of imbalance between these elements. However, he knew that, just as physical illness could affect the state of mind, so stress and powerful emotions could profoundly influence the body and its behaviour. Recognizing the psychosomatic integration in disease, he wrote: “In order to cure the human body it is necessary to have the knowledge of the whole”. And yet, with time, Hippocrates’ scientific method, which saw disease as arising from natural causes, became increasingly popular; reputable philosophers like Galen openly disapproved of the magical element inherent in the traditional view of ill health. Nonetheless, during the time of the Roman Empire, herbal remedies still constituted the main cures used by physicians, while fragrant oils were increasingly used for secular rather than religious purposes, as in the everyday maintenance of basic hygiene (Lawless J., 1994).

On a metaphysical plane, ancient philosophers theorized a great deal about the qualities of odour. Plato, in the fourth century BC, wrote that odours partook of a “half-formed” nature, being thinner than water but coarser than air. This rather ambiguous definition made odours difficult to classify. The primary olfactory differentiation, accepted by the early philosophers, was therefore between pleasant and unpleasant smells. Lucretius (96 – 55 BC), sought a logical explanation for this distinction. He put forward an opinion that pleasant smells, along with all pleasant sensations, were composed of smooth particles, while the unpleasant smells and sensations were composed of hooked particles: “For every shape, which ever charms the senses, has not been brought to being without some smoothness in the first beginnings; but, on the other hand, every shape which is harsh and offensive has not been formed without some roughness of substance.” Therefore, according to Lucretius, it was tactility that formed the basis for all sense impressions. The Greek physician Galen, in the second century AD, suggested that the primary recipient of the sense of smell was the brain rather than the nose, which perceived it. The evidence for this theory he derived from the way in which different odours were found to affect the brain. Galen incorporated the model of the four humours in his description and characterized odours themselves as hot, cold, dry or wet. In general, according to the widely accepted humoral theory, Greeks and Romans believed that the qualities of hot, cold, dry, and wet constituted the fundamental building blocks of the cosmos. Consistent with this scheme, sweet, spicy smells were associated with the characteristics of hot and dry, whereas rotten smells were connected to those of cold and



wet. In this way, it seemed appropriate that hot, dry lands, such as Arabia, should be the source of fine aromatics like cinnamon, saffron and honey, and that the cold wet sea should be a source of foul odours. Furthermore, the bright hot sun itself was linked with fragrance and the cold moon with murky foulness. Consequently, pleasant and unpleasant sensations were not evaluated simply by their different aesthetic features, but were interpreted on a much deeper level – as part of a whole cosmic order (Classen C., et.al., 1994).

### III. On the Trail of Scent through the Middle Ages

Plagues were probably the most outstanding and notorious pandemic events in the medieval Europe, occurring every few years from the fourteenth century until the end of the seventeenth century. The modern scientific explanation is that rat fleas were the carriers of these plague germs. However, at that time, it was held that plague was caused by astrological influences, such as a change in the alignment of the planets or an increase in the rays of the sun and Sirius, the Dog Star. These more dramatic produced pathogenic odours, which were believed to be the true agents responsible for transmission of the deadly disease. The thinkers of that period claimed that the sun and the planets fouled the air with invisible poisons. It was said that Jupiter, being a warm and humid planet, drew up putrid vapours from the earth, which the hot and dry Mars then ignited, sending back to earth the product in the form of a pestilential gas. Others argued that the corrupt air came not from the planets, but from the earth itself and was discharged into the atmosphere through earthquakes (Classen C., et.al., 1994).

This idea that odours were pathogenic carriers of plague was reinforced by the observation that a strong disgusting smell emanated from the victims of this infection. One writer wrote: “all the matter which exuded from their bodies let off an unbearable stench... so foetid as to be overpowering”. Hence, regardless of the source of the plague – whether a result of gushing earthquakes or gases radiating from the planets, the smell was one obvious characteristic that appeared to have the *capacity* of being given off by the ill and internalized by the well, and therefore offered itself as the logical medium of contagion (Classen C., et.al., 1994).

With respect to these theories, the measures taken against the plague involved controlling and resisting the dangerous air with various pungent odours. Municipal authorities held bonfires of aromatic woods in the streets, so as to facilitate purification of the atmosphere. Individuals fumigated their homes by burning incense, juniper, laurel, rosemary, and virtually anything else they deemed effective. A popular olfactory prophylactic device designed to be carried on the person for protection was the pomander – originally an orange stuck full of cloves and later any perforated container packed with scents. Special care also had to be taken when entering a sickroom. One London physician recommended having herbs at the windows, an aromatic fire burning in the fireplace, and rose-water and vinegar sprinkled on the floor, if visitors were expected. Visitors were instructed to wash themselves with rose-water before entering, to keep a piece of cinnamon or other spice in their mouths, and to carry a pomander to smell. Upon leaving, they had to wash with rose-water again. Physicians too often wore a “nose-bag” filled with herbs and spices on their faces when visiting patients. In judging the use of such odorants, one should recognize that while these

measures might not have been adequate in blocking the plague, the plant essences such as those of lavender and garlic nevertheless possessed medically significant germicidal properties (Classen C., et.al., 1994, Figure 6, 7).



**Figure 6.** Lavender has been traditionally added to bathwater. In fact, lavender's name derives from the Latin *lavare* "to wash".

(From: Walters, C: *Aromatherapy, An Illustrated Guide*, 1998)



**Figure 7.** Doctor shown in this engraving (1725) is wearing a distinctive outfit – with sweet-smelling substances carried in the "beak" (or "nose-bag") to combat stench; this was developed to protect against the Plague during the Middle Ages. *Germanisches Nationalmuseum, Nuremberg.* (From: Lyons & Petrucelli: *Medicine: an Illustrated History*, 1987).

Aromatics were also considered the best tools of treatment. In keeping with the contemporary medical theory, the nose provided a direct route to the brain. Consequently, medications that could be inhaled were reputed to have more direct access to the brain, hence the spirit, compared to those swallowed. Moreover, the spirit, or life force was imagined to be related in its nature to odour, so smell was the preferred means of communicating with this inner essence and correcting its disorders (Classen C., et.al., 1994).

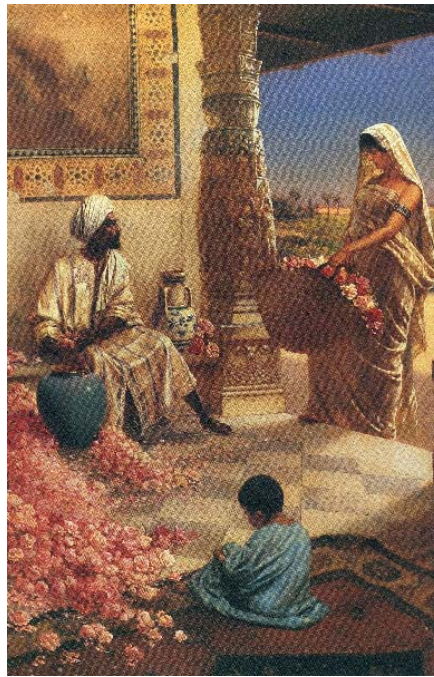
The plague certainly played its role in generating a whole new understanding of the function of odour in the relationship between health and disease. Unfortunately, because the theories of that time lacked the scientific foundation, the convictions that did arise from these rather eccentric notions caused an immense anxiety about the invisible and yet all-pervading odours

of others. Those who wanted to remain healthy must have had to construct nothing less than an olfactory bubble and shield themselves with walls of rosemary and cloves if they were to stand a chance of being safe. Overall, however, it reinforced the earlier concepts of odour as a primary force for good or ill, which thus ultimately held the power of life and death. To this day, olfactory phobias are not unwarranted and utmost attention continues to be paid to odour, which can be not only a useful indicator of disease, but an important agent of curing it as well (Classen C., et.al., 1994).

With the emergence of Christian theology there began a more dramatic reevaluation and restructuring of previous views and traditions. The Church rejected “pagan fragrances” because they stimulated forbidden instincts and heightened sensual pleasure. In addition the Church began to compete with the physicians especially with regard to their claimed ability to cure the mind and soul. Spirituality was to be owned solely by religion, while physicians were allowed to treat the mere physical maladies. Rene Descartes (1596 – 1650) defined human body as a machine and saw no physiological relationship between the mind and the body. Thus, in the philosophical climate of the Dark Ages, senses suffered severe depreciation, although the minds of common people retained the association of perfumes with magic and superstition (Lawless J., 1994).

In AD 529 Pope Gregory passed a decree banning any form of learning that was in conflict with Christian views, and the School of Philosophy at Athens where *materia medica* was taught, closed. The works of Hippocrates, Galen and Dioscorides had to be smuggled to Syria and Constantinople, and were translated into Persian, Arabic and other languages. Among many great Arab physicians, the famous Abu Ali ibn Sina (AD 980 – 1037), also known as Avicenna wrote over a hundred books in his lifetime. In his classic *Canon Medicinae*, over 800 medicinal substances were described and one book was devoted entirely to the favourite flower in the Middle East, the rose. Avicenna is also credited with the invention of a breakthrough method of distilling pure essential oils and aromatic water. From then on, “the perfumes of Arabia” became the most precious in the world (Figure 8). They traveled to Europe as the Crusaders were returning from the Holy Wars and rose water became one of the most popular scents in the West. At that time, the European apothecaries and alchemists adopted the imported distillation techniques and began to experiment with herbs native to their own regions, such as lavender, sage and rosemary. By the sixteenth century lavender water and essential oils become widely available and gained popularity. During the Renaissance the distillation process was industrialized and essential oils became the subject of scientific investigation. By the 19<sup>th</sup> century chemists were identifying the constituents of plant oils, and this knowledge was utilized by the growing pharmaceutical industry (Lawless J., 1995.)





**Figure 8.** “*The Perfume Makers*”, by Rudolph Ernst. This painting illustrates the process of making the famous rose oil in Arabia. (From: Lawless, J: *The Illustrated Encyclopedia of Essential Oils*, 1995)

#### IV. The Modern Scientific Status of Aromatherapy

The term “aromatherapy” was coined by a French chemist, René-Maurice Gattefosse in 1928, making this discipline relatively recent. His accidental discovery that lavender oil healed a severe burn on his hand in a matter of hours and without scarring, sparked his interest in therapeutic value of various plant oils. He went on to investigate their properties and used them in a number of dermatological preparations. In the 60s another French couple – a physician, Jean Valnet and a skin-care specialist, Maguirete Maury introduced essential oils in their practice, prompted further research into their properties and established a place for aromatherapy in the French health service. More recently, aromatherapy has gained considerable popularity in Europe, particularly in the UK and Italy, and is now making its way into the USA and Canada (Trevelyan J., 1993).

There is some research aimed at evaluating therapeutic benefits of aromatherapy, but it is presently rather limited and small-scale. Some research has been undertaken by nurses – one such example is a six-month pilot study conducted by Ethel Burns and Caroline Blamey. These two nurses investigated and described the use of aromatherapy in labour, based on the results of their analysis of over 500 women, who participated. Notably, lavender oil (Figure 9) was highly versatile, as it was found to reduce maternal anxiety, ease pain and tension and lighten emotional stress. Its sedating and relaxing properties were helpful in calming down uterine contractions when a woman was exhausted and needed sleep, whereas clary sage encouraged contractions to proceed unimpeded, thereby quickening labour. The cooling and refreshing peppermint oil was most often used for nausea and vomiting (Burns E. & Blamey, C., 1994).

In our age of empirically based science, aromatherapy is still struggling for acceptance by the health care community at large. Much research remains to be done in this area, but at present it continues to hold its age-old appeal for various reasons. J. R. King (1994) lists three main factors as key components of effective therapy:

1. The *positive attitude* of the therapist. Aromatherapists are frequently described as warm, empathic and genuine “therapeutic personalities” who have the opportunity to get in touch with their patients at an emotional level.
2. The therapy is founded on *shared beliefs*. In common with other successful and respectable therapies, that did not necessarily start out scientifically, such as acupuncture and psychoanalysis, aromatherapy has established itself on certain irresistible features. Its wide appeal is due in part to the popular modern “back to nature” movement and is inspired by sentiments of love, peace and gentleness, all of which are associated with and support healing. “The keynote of your very being is sounded, as the oils bring harmony to your body and spirit”, as expressed in one catalog advertising aromatherapy products.
3. The beliefs should be *scientifically sustainable*. This is one area in which aromatherapy’s weaknesses become exposed. Since its concepts are based on firmly held convictions rather than refutable conjectures, it tends to be static, incapable of progress. At the same time, one should be careful not to undermine its symbolic significance, which by itself may contribute to that “magic” healing effect, so easily shrugged off by science. However, certain therapeutic elements of aromatherapy can be identified if considered separately: the relationship with the therapist, the use of background music for relaxation, the effect of massage, the pharmacological effect of essential oils absorbed through the skin, and the psychological effects of the fragrances. The latter emphasizes that the mind is affected via the sense of smell, as originally hypothesized by Galen. Indeed, the concentrated aroma of the fragrances is said to initiate a complex chain of events within the body by sending olfactory messages to the limbic system of the brain. This primitive region has been called the “emotional switchboard of the brain” because its stimulation influences the individual’s mood, emotions, and overall alertness. The physiological and psychological evidence of such effects make aromatherapists even more enthusiastic about their craft (King J.R., 1994).

In the modern Western society, there is a shift toward reconciling the body with the mind and a growing demand for the natural holistic remedies that take the individual as a whole. Many ancient forms of therapy, including the Chinese acupuncture and aromatherapy are enjoying a revival. Attempts to integrate the traditional with the modern, and the spiritual with the scientific are being made, and yet there continues to be a struggle between the ‘orthodox’ and the ‘alternative’ schools of thought. Perhaps, looking at the medical experience in the East, where no such mind/body split occurred, can provide some inspiration.

In India and China, plant medicine developed over many thousands of years to an amazingly advanced degree, and continues to be held in high esteem to this day. According to their philosophical systems, life is regarded as the mutual interaction of body, mind and soul, with the life force *prana* (in Chinese *chi*), being the essential mediating factor. *Ayurveda* is the branch of Indian medicine that utilizes medicinal plants for holistic healing purposes; as a

form of Aromatherapy, it employs medicinal oils for massage as well as in mixtures with wine or honey to be taken internally (Lawless J., 1994).

*Today, many people look toward any available alternative treatments as adjuncts to the conventional medical therapy. Aromatherapy, in its many versatile applications, is one of the most common and recognized complementary treatments for stress related disorders. Absorbing essential oils by inhalation and via the dermal skin layer with the healing touch of massage can be powerful in alleviating tension and stress and improving the effectiveness of the immune system. Professional aromatherapists select particular oils that are known for their specific healing characteristics, so they can target certain conditions, including: premenstrual syndrome, stress-related ailments (which can include anything from heart disease to autoimmune disorders), moderate anxiety or depression, sleeping problems, minor aches and pains, migraines, digestive disorders, skin problems such as eczema and acne, and minor infections such as thrush and cystitis (Forsythe C., 2001).*



**Figure 9.** Lavender is an evergreen shrub with pale green leaves; in the summer it blooms with highly scented violet-blue flowers. (From: Walters, C: *Aromatherapy, An Illustrated Guide.* 1998)

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# THE HISTORICAL DEVELOPMENT OF CHIROPRACTIC

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## ABSTRACT

Chiropractic is a form of medical therapy based on the belief that misalignment of the spinal vertebrae produces disorders in various organs. As a result, manipulation to re-align the spine cures the problem. The origin of chiropractic can be traced back over 3000 years, when the first evidence of spinal manipulation appeared in Chinese writings. The historical record then moves to Greece, where Hippocrates wrote extensively on the subject of spinal manipulation. His ideas spread into the Middle East during the Middle Ages, being published in Europe by the end of this time period. By the end of the eighteenth century spinal manipulation had been adopted by many physicians, only to be abandoned by the medical profession by the end of the nineteenth century out of fears of its causing harm. The apparent return of a deaf janitors hearing through the use of spinal manipulation by D.D. Palmer in 1895 is cited as the birth of chiropractic as it is known today. While the technique utilized by Palmer was not unique, his coupling of it with a doctrine was. Soon thereafter Palmer opened a school, which was taken over by his son B.J., who turned chiropractic into a true business. From the beginning not all the students bought into the doctrine, believing in the use of methods beyond spinal manipulation. What ensued was a war of words fought through the formation of professional organizations. The creation of state licencing legislation and recognition of a national accreditation body have helped legitimize chiropractic. With the legal success over the AMA and growing evidence of the benefit of chiropractic it is almost sure to exist for many years to come.

## First Origins

Chiropractic is a system of therapy based on the theory that health is determined by the condition of the nervous system and an optimal neurophysiological balance, which is maintained through correcting biomechanical abnormalities, primarily of the spine. As a discipline, chiropractic consists of two components, doctrine and methodology. While the doctrine only came into existence just over one hundred years ago, the method it employs can be traced back over the past 3000 years, beginning in China. A Chinese Kung Fu document made the first reference to the use of spinal manipulation as early as 2700 BC (Homola, 1999) and although no specific mention of spinal manipulation is made, a Chinese medical text called *The Yellow Emperor's Classic of Internal Medicine*, written about 2000 years ago, describes massage and exercises (Halderman, 1992).

## Hippocrates

The historical evidence then leads us to Greece where Hippocrates (460 – 375 BC) wrote extensively on the subject of spinal manipulation. Within his books *On Fractures*, *On Setting Joints by Leverage* and *On the Articulations* he covered not only diagnosis, explaining how to differentiate between luxations and subluxations, but also how to use spinal manipulation in treating such disorders. In treating a scoliotic curvature of the spine Hippocrates recommended the patient lie face down on a soft but unyielding bench. Then with one strap under the arms and around the chest and another around the knees and ankles to provide traction a physician or other strong person was to place the palm of one hand on the hump, then the second hand on the first and apply pressure downward, toward the head or toward the hips (Homola, 1999). Alternatively pressure could be placed on the hump by sitting upon the hump, raising oneself only to fall on the patient or by placing a foot on the hump and gently applying ones weight (Homola, 1999). A second method Hippocrates wrote of was thrusting a board against the spine. This involved placing the patient face down and under traction as before, then having one or two people press down on a board aligned with the area of the spine undergoing treatment. A third method, differing considerably, involved strapping the patient to a ladder then dropping the ladder from a height. This was intended to stretch the spine thereby reducing the dislocation (Homola, 1999).

## Beyond Hippocrates

Hippocrates' ideas spread into the Middle East during the Middle Ages, appearing in an influential medical book written by Avicenna of Baghdad. The translation of Avicenna's works into Latin and publication in Europe occurred at the end of the Middle Ages (Halderman, 1992). In the sixteenth century the French surgeon and influential Western European medical authority Ambroise Paré both wrote of and taught Hippocrates methods. Other sources of reference on spinal manipulation in Europe included *The Compleat Bone-Setter*, written in 1656 by Friar Moulton of St. Augustine, and *The Surgeons Store-House*, written in 1674 by Johannis Scultetus, were both published in English. At the beginning of the eighteenth century spinal manipulation was the domain of bonesetters, laypersons who developed the skill of reducing fractures and dislocations. By the end of the century this procedure had been adopted by many physicians (Homola, 1999). During the first half of the nineteenth century spinal manipulation fared well in the medical literature and among those physicians who knew of it, but by the end of the nineteenth century spinal manipulation had been all but abandoned by the medical profession, likely because it could be dangerous (Haldeman, 1992).

## The Arrival of Chiropractic

At the age of twenty Daniel David (D.D.) Palmer migrated from Canada to the United States. Here he worked at several jobs including schoolmaster, farmer and grocer until he began practicing magnetic healing in Burlington, Iowa in 1886. As a magnetic healer Palmer claimed that the body had an “innate intelligence” whose flow throughout the body, via the nervous system, produced health and impeding the flow caused illness (Kaptchuk *et al.*, 1998). The following year he moved to Davenport, Iowa where he developed a thriving

practice (Homola, 1999). On September 18, 1895 a janitor by the name of Harvey Lillard came to see Palmer. Lillard, who had been deaf for the past seventeen years, told Palmer of how he had been exerting himself in a cramped position when he felt something in his back give way and became deaf. Observing a displaced vertebra in Lillard's back, Palmer reasoned that if he returned the vertebra to its original position he could restore Lillard's hearing. Sure enough, as soon as Lillard's spine was manipulated and the vertebra popped into place he could hear again (Homola, 1999). From this experience Palmer stated that 95 percent of disease was caused by displaced vertebrae. He reasoned that the displaced vertebra interfered with the body's "innate intelligence" and by his removing of this Lillard's hearing was restored. D.D. Palmer had combined both the methodology that had been used for centuries, likely passed to him by a bonesetter (Kaptchuk *et al.*, 1998), with a doctrine, likely coming from magnetic healing, to create the discipline of chiropractic.

### **The Business of Chiropractic**

In 1897 D.D. Palmer opened the Palmer School and cure, soon renamed the Palmer Infirmary and Chiropractic Institute where he taught a three-week course. D.D. Palmer's son Bartlett Joshua (B.J.) Palmer graduated from his father's school in 1902 and by 1906 owned it. B.J. was an entrepreneur to say the least. He aggressively recruited students and by 1921 the school had an enrollment of 2000 students and a one million dollar annual income. Within three years the school had 3000 students (Homola, 1999). It was at this time that B.J. introduced the neurocalorimeter. The device, which was nothing more than a thermocouple, measuring differences in skin temperature on opposite sides of the vertebrae was supposed to be an infallible means of detecting even non-symptomatic subluxations. The patented instrument cost \$2,200 and was only available to graduates of B.J.'s school. Following the introduction of the calorimeter a number of B.J.'s followers deserted him to start their own schools. With enrollment falling B.J. introduced the new theory that subluxation of the atlas alone caused disease and claimed that students need to attend his school to learn this theory and that practicing chiropractors needed to attend for additional training. All the while, B.J. had been selling chiropractic equipment by mail order (Homola, 1999).

### **Straights vs. Mixers**

Even from the beginning not all students at the Palmer school adopted the doctrine. In 1905 a group of chiropractors that believed in using additional treatment methods, known as "mixers", formed the Minnesota American Chiropractic Association. In response, B.J. formed the Universal Chiropractors Association a year later. This group consisted of "straights" or those who stayed true to the original Palmer doctrine. A war of words went back and forth and both groups went through name changes. In 1926 B.J. formed the Chiropractic Health Bureau, which in 1941 became the International Chiropractic Association (ICA). The ICA is the current organization that represents the "straights." In 1928 the National Chiropractic Association was formed to represent the "mixers". In 1961 the organization adopted its current title, the American Chiropractic Association (ACA) (Homola, 1999).

## A Profession?

As the war of words went on between the “straights” and the “mixers”, various states enacted licensing legislation. Kansas was the first to do so in 1913 and North Dakota followed suit in 1915. By 1950 forty-four states had legislation on the licensing of chiropractors. As part of these laws chiropractic schools were required to teach four year programs (Homola, 1999). Further legitimization occurred in 1972 when The United States Congress extended Medicare, Medicaid and Worker’s Compensation coverage to include spinal manipulation and in 1974 (Kaptchuk *et al.*, 1998) when the Council on Chiropractic (CCE) Education was recognized by the United States Office of Education. Previously formed by the NCA in 1947 and becoming autonomous in 1971, the CCE is now responsible for accrediting Chiropractic colleges, one of which a student must graduate if licensure for practice is sought (Homola, 1999). While legally chiropractic was gaining acceptance, the medical profession continued to marginalize it. In 1957 the American Medical Association (AMA) interpreted one of its clauses to forbid any of its members from consulting with chiropractors. The Committee on Quackery was formed in 1963 to contain and eliminate chiropractic as a health service (Homola, 1999). An anti-trust suit brought against the AMA in 1976 by five chiropractors resulted in the AMA being found in violation of federal antitrust laws. In 1990 the United States Supreme Court let the decision stand (Kaptchuk *et al.*, 1998).

## Where Do We Go From Here?

The method of spinal manipulation has existed for centuries, but it was its coupling with a doctrine roughly a century ago that created chiropractic as we know it today. Since then the field has persisted, grown and even thrived in the face of conflicts, both internal and external, and a lack of scientific evidence for much of what is practiced. One of chiropractic’s strengths, likely to have been instrumental in its survival and success is its employment of the patient-centered model of care. In a sense chiropractic has unknowingly created a niche for itself where medicine has often left off. No matter how inaccurate the diagnosis or maladaptive the treatment, chiropractic provides patients with what they really desire: a validation of their concerns, a diagnosis, an understandable explanation and a sense of progress toward better health. Medicine has been wise to begin adjusting to these needs of patients. Such change may afford medical practitioners the same access to the patient that many chiropractors have enjoyed. Now with a growing body of knowledge that chiropractic is useful in treating some lower back problems and limited musculoskeletal disorders it is almost certain that chiropractic will be around for many years to come.

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# **THE SEPARATION OF THE PROFESSIONS OF PHARMACY AND MEDICINE**

By

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## **ABSTRACT**

**The history of humanity's treatment of illness and disease has created many of the different types of medical professionals we know today. As our understanding and knowledge of health and healing became more advanced, there became a need for the traditional healer to specialize in certain area. The history of pharmacy illustrates how one of the first such specialties branched off from medicine. From the days when the medicine man was a one-man show, to the very first licensed pharmacy, and to the present where the paradigm of patient centered care is being practiced by both pharmacists and physicians, pharmacy has become more and more a specialized discipline and an autonomous profession. Along the way some famous physicians were also famous pharmacists. In some times and places physicians and pharmacists have been either close allies or famous enemies. Currently, in hospital or in the department store, the pharmacist is well integrated into society, and pharmacy is one of medicine's most respected sister professions.**

Since the beginning of man on earth, people have been searching for ways to restore health and bring about cures. As medical knowledge has progressed, and successes have been realized in some areas of disease, it has become necessary for the responsibility of health care to be spread out. The days when one person could be priest, physician and tribal leader have gone. We now have a multitude of health care professionals, each with their own domain of expertise, but the delegation of responsibility didn't always follow a smooth road. One of the first medical professions to separate from physicians was that of pharmacists. The history of the development, and the struggles to maintain recognition as a profession, spans many eras in man's history.

## **Ancient Civilizations**

The very earliest of our medical knowledge comes from this era. At this time in history physicians, priests, and sorcerers were all identified as medical practitioners. In fact, one person often wore all three hats in smaller communities. Cures involved a spiritual-religious purification, as the belief that one could avoid disease by leading a righteous life and worshiping the proper gods was firmly held. Even at this early time, there was a search for cures from the natural surroundings. Perhaps it was instinct, or perhaps it came from



watching animals eating various plants to cure ills, but whatever the reason, this was the beginning of pharmacological therapy (Cowen and Helfand 1990).

During the Mesopotamian era, great advances were made in the areas of drug therapy. The unearthed clay tablets from this time are the earliest known medical text and pharmaceutical compendium. These early recordings suggest that not just natural materials were used, but were manipulated to make medications. There is, in fact, evidence that even at these times there were functionaries who had knowledge of pharmaceuticals and compounding (Sonnedecker 1976).

### **Ancient Egypt**

Many similarities exist between the civilizations of Mesopotamia and Egypt. Spirits and evil forces were the cause of many illnesses, so again the priest as well as sorcerer and physician were all medical professionals. There was development of the practice of medicine to the empirical-rational stage in some regards, but this approach was combined with religion and magic. Of significance during this time was the writing of the eleven medical papyri. The most correlational to pharmacy was the Ebers Papyrus, written about 1500 BC. It was a record of prescriptions, using over 700 different drugs, and covers a variety of medical subjects (Cowen and Helfand 1990). The preparation and administration of these drugs was rooted firmly in magic and religious practices of the time. An artful physician not only chose the correct drugs, but combined them with the right magic to bring about a cure (Cowen and Helfand 1990) (Sonnedecker 1976).

With the greater dependence on, and increasing number of drug preparations, there was still no functionary in Egypt who performed the sum total of all pharmaceutical services. There were many people who carried out some of the tasks, like root gathering, or preparation of drugs, under the supervision of the physician. The lack of a separate professional who was responsible for pharmaceutical services can be appreciated even further as the Chief of the Preparers of Drugs was also the Chief of the Royal Physicians (Sonnedecker 1976) (Cowen and Helfand 1990).

### **Greco-Roman Era**

The birth of the Greco-Roman era brought about a great change in the approach to science and medicine. There was a shift towards a rational and empirical approach for the treatment of disease, and an interest in the natural causation of disease. There were four substances that were defined as the primary elements from which all things derive: water, air, fire and earth. For many centuries these four elements became the foundation of the system of humoral pathology and pharmacotherapy. The humors that corresponded to the four elements (phlegm, blood, yellow bile, black bile) must be in balance in order to maintain health. It was thus the physician's task to restore balance, and to this end he used a variety of drugs. A high level of pharmaceutical skill and art was attained in the preparations of fomentations, poultices, gargles, pessaries, pills, ointments and more (Cowen and Helfand 1990).

Of great significance to pharmacy at this time was the writing of *De Materia Medica* by Pedanius Dioscorides. In this work, he discussed over 600 plants, 35 animal products and 90 minerals. *De Materia Medica* set the pattern for all later pharmacopoeias, as Dioscorides described habitat, properties and type of action, medicinal usage and side effects, instructions on harvesting, preparation and storage, and magical and nonmedical uses. Dioscorides was largely responsible for the modern plant nomenclature we use today, as well as the beginnings of pharmacognosy and pharmacology (Cowen and Helfand 1990).

Although great advances were made in pharmaceutical sciences at this time, the practice remained the function of the medical practitioner. Groups of collectors and sellers of drugs did develop, and the physician found it increasingly convenient to rely on the expertise of a specialist in preparation of remedies. Galen, however, prepared his own remedies and was critical of those physicians who relied on others. Galen built on the work of Dioscorides and organized the drug data under the framework of humoral pathology. He developed a system of rules and procedures in using drugs, and also experimented in compounding new preparations. It is evident that he not only made a significant contribution to the practice of medicine, but also to pharmacy (Cowen and Helfand 1990).

## **The Arab World**

As Arab empires developed, so did their knowledge of science, literature and medicine. They built on the works of other nations that came under their rule, and on the knowledge that was developing elsewhere in the world. It was in this time that the first pharmacy was established, and the attainment of professional identity and independence of the pharmacist became recognized. The pharmacist was indeed a new specialist, and had command over the ever increasing number of drugs, and complexity of preparations that were being used. The first pharmacy shop was apparently in Baghdad, founded in 762 AD. In the ninth century a class of formally educated pharmacists emerged, however these pharmacists were outnumbered by drug and spice dealers and so it became necessary to license proper pharmacy shops. As physicians began to rely on these services, a system developed much like ours today, where physicians would write out prescriptions, and they would be dispensed by a pharmacy. The development of hospitals played an important role in the development of pharmacies as well. By the twelfth century, hospitals were designed with pharmacies in them, and trained pharmacists were employed. A code of ethics was formulated and accepted at this time, an important step in the development of any profession. The pharmacist was called to “have deep religious convictions, consideration for others, a general sense of responsibility, and be careful and God-fearing”. The shop was to be clean and well stocked, and profits were to be kept moderate (Cowen and Helfand 1990).

## **Medieval Europe**

After the fall of the Roman Empire, medicine, along with the other arts and sciences, took a step backwards. The greater dependence on the healing power of faith and folk medicine, and the oppression of new developments in science added little to the practice of medicine and pharmacy that had been procured in the Roman and Arab times. The monasteries, however, tried to acquire and preserve ancient knowledge. They established their own herb

gardens and pharmacies, and kept the practices of pharmacy and medicine alive in some parts of Europe (Sonnedecker 1976).

During this time, guilds of pharmacists did start to develop, and the term *apothecary* began to be used. In some areas, there were not enough pharmacists to form their own guild, so they joined the spice dealers, and later became known as the Company of Grocers in England. An important development in European pharmacy was the issue of an edict in the thirteenth century by the Holy Roman Emperor Frederick II, which legally separated pharmacy from medicine. The reasons for this were likely two-fold. First, the practice of pharmacy had become highly specialized, and a trained professional needed to have the knowledge in safe and proper compounding and dispensing. Second, it was recognized that there was a conflict of interest if one person could charge a patient both for diagnosing and dispensing drugs for their illness. This regulation promoted the profession of pharmacy, and raised the pharmacist's social status (Cowen and Helfand 1990).

### **The Renaissance**

During the Renaissance, a revolution of thought and outlook on life dominated. The oppression of the middle ages was a thing of the past, and science and medicine benefited from the advances made in this period. One of the prime movers of this time was Paracelsus, who questioned everything, including the long accepted four humoral elements of Greco-Roman times. He theorized that disease was a localized abnormality, not an imbalance of humors, and could be righted by correcting the chemical abnormalities in the body. Because of this, pharmacy saw the use of tinctures, extracts, spirits and alcohol play a large role in Paracelsus' therapy. Pharmacy became increasingly associated with alchemy, and a pharmacist played the role of chemist and botanist (Cowen and Helfand 1990).

There was still legal separation between the two professions, and so capitalistic physicians and pharmacists would often would together, or employ one another. In some areas of Europe however, there was tension between physicians and pharmacists. In England, the apothecary became increasingly involved in the practice of medicine. The reasons for this stemmed from the shortage of physicians in England at the time, and the preference of trained physicians to work for the elite. During the plague, many physicians left London, and continued to enhance the position of apothecaries (Cowen and Helfand 1990) (Copeman 1967). Despite this tension, pharmacy had come a long way during the Renaissance, with the extensive pharmaceutical literature that had been created, and the university education now required of pharmacists.

### **The Early Modern Era**

By now, the profession of pharmacy had gained recognition as providers of health care. The dispute between the borders of practice between physicians and pharmacists raged on in parts of Europe, most notably England. The debate was taken to the courts, but on at least one occasion it was determined that to limit the practice of apothecaries went against custom, but also against public interest since there was not enough physicians to provide care. Over time, however, an emerging group of chemist-and-druggists emerged in England, which made

inroads into the traditional apothecary's trade. It is from these chemists-and-druggists, who did almost everything the apothecaries did, but did not leave their shops that our current system of pharmacy developed (Cowen and Helfand 1990).

### **The Modern Pharmacist**

The Industrial Revolution had a large impact on pharmaceutical services. Complex preparations could now be mass produced, and the beginnings of novel drugs like antibiotics changed the way the pharmacist practiced (Cowen and Helfand 1990). These changes led to some of the current concepts in pharmacy, such as Pharmaceutical Care, where the patient is the focus of care, as opposed to the drug. The Clinical Pharmacist has also become a recognized specialist in areas of drug treatment, and is employed in many hospitals and clinics. Pharmacists are still responsible for the preparation of complex drugs, such as intravenous formulations and oral medications of all types, but now the acceptance of pharmacy technicians to carry out those tasks has left the pharmacist to only supervise. This lets pharmacists spend more time to act as consultants to physicians, government and industry. The community drugstore also has an important role in society, as pharmacists are recognized as the most accessible health care professional. Indeed, the public can walk into a drugstore, often day or night, without an appointment, to receive reliable health advice on many medical problems.

The development of pharmacy as a profession has a long and interesting history. The current practice has been shaped by the works of many forefathers, the developments in science, and the social environment of the times. In our modern times there are many allied medical professionals, and a team approach to patient care is now recognized as optimal. The future still holds many challenges for the profession of pharmacy, with increasingly complex drugs, reliance on industrial production and some of the previous roles of the pharmacist now being carried out by other allied health professionals. But pharmacy has been accepted into society as a vital medical profession, and constant changes required to maintain the profession are part of the developing world we live in. We can be sure that as long as people are trying to find cures for their ills, there will always be a place for pharmacy.

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# **THE PASSING OF THE BLADE: EARLY EUROPEAN SURGICAL CONTRIBUTIONS TO MODERN DAY SURGICAL EDUCATION**

By

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## **ABSTRACT**

**With the forbidding of blood shedding operations from monastic medicine by Pope Innocent III (1215), the practice of surgery underwent a number of paradigm shifts. Through surgery there was a quest for fortune, for social stature, for professionalism and for knowledge. In the West surgical practice was in the hands of Catholic clergy, barbers, anatomists and physicians to name a few. With each contribution, surgical care was not only caring for the ill but also the prevention and intervention of disease and an understanding of structure, function and pathology.**

**This attempt to develop a place for surgery within Western medicine was tumultuous at times. A number of associations, guilds and fellowships were formed and disbanded with members of these various groups. Also, according to legal codes surgeons would pay substantial fines or were executed if patient care was unsatisfactory. Despite these threats and often with bitter controversies, the practice of surgery moved forward.**

**The education of surgeons today is still intimately linked to the work of our predecessors. The present day patient care model was applied daily by the Barber's guild; an understanding of structure and function was gained from our anatomists; the development of residency programs and didactic lectures from the elite surgeons and the importance of history, physical exam and physiology has been derived from physicians. In addition, from each of these groups came the development of operative procedures and instruments which are still practiced today. As medical education evolves we still see a balance of the philosophes of the Barber's guild, the anatomists, the elite surgeons and the physicians.**

Proclaiming that early surgeons were brutal, coarse and ignorant people, the history of surgery has often been viewed by some historians (and surgeons) with disdain. However, in the middle ages, and other periods, there did exist intelligent practitioners of surgery with a keen sense of observation, concern for patient care and a curiosity-based drive for surgical knowledge.

The practice of modern Western surgery is still feeling the impact of teachings from earlier times. It is undeniable that the practice of surgery has been influenced by a number of cultures (i.e. Arabic pioneers). However, in the thousand years following the fall of the Roman Empire in the West, and before the solid establishment of universities, the development of surgery in middle age Europe occurred mostly in cultural isolation (Bishop, 1960).

Throughout this period surgery did, however, have a diversity of its own kind. A number of different backgrounds, including monks, barbers and academics all contributed to the practice of surgery. In addition to surgical skills, this diverse group has provided many contributions to today's surgeons, especially in the areas of educational methods, ethics and conduct.

The middle ages in Europe were preceded by a time of hunger, pestilence and war. Overwhelmed with the notion of survival, the average person had neither the time nor the energy to focus on scholarly development nor the care of the sick. Medicine, or more to the point, the care of the ill lay in the hands of the monastic clergy (Pouchelle, 1990). Given that the monastic doctrine of the time was more concerned with the tending to and the healing of the sick rather than medical development, the Church has often been faulted with hindering the development of medicine and surgery. Disease itself was considered an entity to be endured and tolerated and the human body sacred (Bishop, 1960). As such the pursuit of medical knowledge and experimentation in anatomy and physiology came to a halt.

The monastery at Montecassino under the direction of St. Benedict (480-?) had a hospice and eventually a hospital in the 7<sup>th</sup> century where ailing persons could be lodged and received personal care (Bishop, 1960). This monastery and that of Cassiodorus (490-585) also possessed lists of medical herbs readily available to their patients (Bishop, 1960). Also, Cassiodorus did encourage the learning of Hippocrates, Galen and other teachers so that at the dawn of the middle ages, the seed for medical education had been planted again (Pouchelle, 1990).

In the early Middle Ages the Benedictine monks established a cathedral school in Charlemagne (Pouchelle, 1990). In 805, medicine was included in the curriculum under the study of physics (de Moulin, 1988). Therefore although the Church initially did not further surgical advancements, there was the retention and maintenance of medical literature that is still studied today. Also the use of the hospice for centralized patient care and the emphasis on developing a strong caregiver-patient relation are concepts still used today in surgical training.

One of the greatest schools to arise from this time was in Salerno, Italy. As the quest for medical knowledge intensified, the Church Council of Clermont in 1139 forbade monks and clerics from practicing medicine (Pouchelle, 1990). While medical training was now the responsibility of Universities, surgical training went in two directions. In one direction academics, such as Theodorus, Bishop of Cervia, advocated university training of surgeons. In his book, *Cyrurgia* published in 1275 he describes advancements in wound care, the use of

narcotics for anaesthesia and surgical procedures (Bishop, 1960). Theodorus was also credited with gaining wider acceptance of dissection (de Moulin, 1988) so that by the 14<sup>th</sup> century dissection was practiced at the University in Bologna (Bishop, 1960).

William of Salicento (1210-1280), also an academic, was instrumental in the development of the school of surgery at the University of Bologna. His teaching could be echoed today by a surgical resident, *“Those who practice this art should be acquiescent to the wishes of the patients and conform to them, if they do not in any way result in disadvantage to his operations, and to comfort the patient by gentle actions, soft words, agreeable and proper...”* (Zimmerman, 1967). Here his students were being asked to focus on the importance of patient involvement in his or her health care; that patients gain confidence in their surgeons when they feel that wishes and concerns have been listened to (Stuart, 1995).

Other influential principles of William included the use of the knife instead of cautery iron and the discouragement of suppuration for healing (Zimmerman, 1967). His group established a 5 year study of surgery, after which candidates underwent an oral examination, a model employed by surgical residency programs today (Bishop, 1960). Although both men were anxious to unify medicine and surgery at the University level, they both also strove for division among themselves and the other surgical practitioners, the Barber-Surgeons.

When the men of religious orders were forbidden to shed blood, early surgical practices were transferred to the barbers as they were familiar men around the monastery used to blade (Dobson, 1979). Concern over ruined reputations and injury to the public were the reasons for wanting great control over training requirements and ethical behavior from within the profession (Zimmerman, 1967). Surgery involved mainly trephination and the treatment of wounds, fractures and dislocations (Bishop, 1960). The regulation of this said craft initially began with guilds but in order to ensure safety and accountability the Fellowship of Surgeons united with the Barber-Surgeon Company by a parliamentary act in 1540 (Dobson, 1979). Given that there were far more barber-surgeons than physicians, a combination of primary care and procedures comprised a barber-surgeon practice. Sub-specialization established by the Company, allowed persons to be trained as ships' surgeons or as a field surgeon for warfare in addition to a general barber-surgeon (Dobson, 1979). From all types of practicing barber-surgeons was generated a variety of vernacular surgical handbooks, not unlike the pocket on-call books of today.

Since most barber-surgeons were illiterate their training occurred via apprenticeships. In such venues was gained early and solid practical experience and personal teacher-student interaction. However by 1768 in France and 1745 in England, the education and regulation of surgery no longer rested with apprenticeship and guilds but at private schools (de Moulin, 1988). The validity of apprenticeship learning though has prevailed. The surgical residents in Canada work for and learn from experienced consultants whom prepare students for examinations and the practice of surgery.

The opening of private anatomy schools and later hospital centers greatly furthered bedside and clinical training, as students and practitioners alike delved into the investigations of normal anatomy, physiology and the alteration of morphology and function with disease.

Also of great emphasis were the issues of conduct and ethics. *“That if of established reputation, the surgeon should do his best for his patient after giving due warning to the patient and his friends, otherwise he should by all means avoid such a case”*. This quote by Lanfranc, chief of the French school of surgery and associate of College de St. Côme, stresses the importance of professional advice balanced with informed consent to the students of his school. This and the formation of clinical and bedside training are key concepts in medico-surgical education practiced today.

“No one can be a good physician if he is ignorant of surgical operations, and no one can perform operations if he does not know medicine”. Lanfranc echoes the essential inter-relation between medical and surgical fields in order to produce competent and qualified doctors. This concept is reinforced for medical students and residents alike as classroom teaching and clinical experiences are required from both the branches of medicine and surgery.

Present day surgery has enjoyed a wealth of contributions from around the world and throughout different time periods. From the Middle Ages we gained knowledge of anatomy, physiology and disease processes. In addition to the development of surgical tools and techniques, surgery has also gained methodologies and a code of conduct. The monasteries, barber-surgeons and academic surgeons all gave ways in which to educate students and enhance the patient-physician relationship so as to create the competent and compassionate surgeons students strive to be today.

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# **JOHN SNOW: CHOLERA IN LONDON IN THE 1800'S**

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## **ABSTRACT**

**In August of 1854, in the Golden Square District of London, a severe outbreak of cholera killed over 500 people in a ten-day span. Most of these deaths occurred within an area of only a few square blocks, creating a panic in this area of South London. Little was known at this time about cholera, until John Snow, now known in more than one area of science as “The Father of Epidemiology”, developed a theory on the spread of cholera which has held true through to today.**

**John Snow, a physician in London at the time, developed an interest in cholera years before the 1854 epidemic. He wrote a pamphlet entitled “On the Mode of Communication of Cholera” which detailed his theories and was later published as a book by the same name. Dr. Snow theorized that cholera was spread not as a noxious gas in the air, as was the current thinking, but through the fecal-oral route with contaminated water being a major source. He tested his theory in 1854 by tracing the source of water from each afflicted household in the region, discovering the Broad Street water pump to be the common source. His recommendations to the Board of Guardians of St. James Parish resulted in the now symbolic removal of the pump’s handle, and the dramatic slowing of the death rate due to cholera. Further, his completion of a “spot map” detailing the geographic locations of the deaths around the Broad Street pump gained him considerable recognition as a geographic epidemiologist.**

**John Snow, also famous as the physician who administered anaesthesia to Queen Victoria during the birth of two of her children, was ahead of his time with his theories on cholera. Science confirmed decades later what Dr. Snow already knew, years before he could objectively prove it. Both this genius and the innovations by which he sought to test his hypothesis have led to the recognition and respect he is afforded today.**

Over a century has passed since London, England suffered from terrible epidemics of cholera. Little was known at this time of the dreaded disease which rapidly killed hundreds, and there was virtually no prevention or treatment. Dr. John Snow, an anaesthetist with an interest in infectious diseases, developed and tested his own theories on cholera. His findings had a significant impact on the duration of the epidemic of 1854. Moreover, the methods

with which he made his discoveries and deductions have not only influenced modern science, but continue to spark debate in the medical and epidemiologic communities.

John Snow was born on March 15, 1813 in York, London (McLeod, 2000). He trained as a medical apprentice before completing his medical education at the Hunterian School of Medicine in Soho. In 1852, he was selected as orator of the Westminster Medical Society (now known as the Medical Society of London), and in 1855 was elected as president (Frerichs, 2001). These and other such administrative appointments earned him good standing within the medical community. Medically, he is most known for his work with cholera, but is also famous for other significant contributions he made to medical science. In 1846, he began to experiment with ether and chloroform, and later published two time-honoured books on anaesthetic uses (Brody, 2000). By 1850, he had become well enough established as an anaesthetist that he was asked to administer anaesthesia to Queen Victoria for the birth of Prince Arthur. While his services were not actually used for that event, he did administer anaesthesia to the Queen for the births of Prince Leopold in 1853 and Princess Beatrice in 1857. He was in the process of writing a book on these experiences when he died on June 16, 1858, at the age of 45, presumably of a stroke.

Dr. Snow was first exposed to cholera epidemics while still an apprentice surgeon-apothecary in 1831 (McLeod, 2000). Subsequent epidemics in 1848-1849 with two outbreaks in south London piqued his interest in the disease, and he began to question the dominant theories of the time. Snow hypothesized that cholera was a localized disease of the gut whose symptoms were almost solely due to fluid loss. He believed that the causal agent was transmitted by mouth, multiplied within the gut, and spread through the fecal-oral route. He deduced that spread could occur directly, as in person-to-person contact or contact with a contaminated object, or through more indirect means, such as the transmission of the disease by drinking water contaminated by sewage. The local outbreaks of 1848-49, with their water source as the sewer-contaminated River Thames, seemed to concur with his thoughts. Snow documented his theory in a 1949 pamphlet which was later expanded and published as a book by the same title, "On the Mode of Communication of Cholera".

An especially severe epidemic struck in the Golden Square district in 1854, killing over 500 people in a 10-day span from August 3 to September 9 (Brody, 2000; McLeod, 2000). Incredibly, the majority of these deaths took place within an area of only a few square blocks. Dr. Snow realized this was an opportunity to further investigate his ideas. On September 5, he obtained a list of 83 confirmed deaths from the Registrar General's Office, and went to the region of these deaths (McLeod, 2000). He noted that the drastic clustering of deaths had occurred in an area served by one water pump, located on Broad Street. He conducted a door-to-door investigation of afflicted households, specifically questioning their sources of drinking water.

In the earlier epidemics of South London in 1849, the two outbreaks occurred in regions where drinking water was supplied from the same area of the River Thames (McLeod, 2000). By 1854, one of these companies had moved its water source to a notably cleaner area of the river, upstream of sewage deposits, in accordance with the Metropolis Water Act. Snow's research showed that there were only scattered deaths among households who had obtained

their water supplies from this company's pumps. In sharp contrast, those households served by the company who had not moved its water supply had an overwhelming number of deaths. One such water pump - the pump on Broad Street- was seemingly surrounded by the most concentrated region of deaths.

Snow presented his findings to the Board of Guardians of St. James Parish in the form of a "spot map", a geographical map of the affected area (including the locations of the water pumps), with black boxes placed to indicate the number and location of the deaths in each region (Brody, 2000). The maps were updated at later times as the exact numbers of deaths and exact positions of affected households were confirmed. Originally, Snow did not have access to the more accurate government maps, and misplaced the Broad Street pump on his own map by 20 feet. These inaccuracies did not detract from the obvious significance of Snow's work, and in his own words: "In consequence of what I said, the handle of the pump was removed on the following day" (Brody, 2000). Within a few days of the removal of the pump's handle, the death toll in the region was drastically reduced (McLeod, 2000).

These events have proven significant in studies since of medical epidemiology. Snow's spot map, in fact, earned him the title as "The Father of Shoe-Leather Epidemiology" (McLeod, 2000). Debate continues as to the accuracy of certain details. For instance, some accounts have Snow himself actually removing the handle of the pump in question; others point out that while such a picture is certainly appropriate symbolically, no official records of this event were ever found in the Parish Minutes. A few points of Dr Snow's contributions, alleged or otherwise, deserve comment:

Firstly, the true genius of John Snow's work was deducing the pathogenesis of cholera decades before science could prove it. Robert Koch isolated *Vibrio cholerae*, a gram negative bacteria, 29 years after Snow wrote his book on the transmission of cholera (White, 1999). It is now medical fact that the cholera bacterium is transmitted by the fecal-oral route. It remains in the lumen of the gut, where it multiplies and secretes enterotoxins (Agarwal, 1999). These toxins are responsible for such massive amounts of diarrhea that patients in hospital must lie on "cholera beds", or cots with built-in buckets to catch the fecal waste as it flows uncontrollably. This "rice water" diarrhea causes the severe dehydration and electrolyte imbalances which ultimately cause death in nearly all patients if left untreated.

What is now known of cholera was predicted by Snow when he did not have the technology to prove it. It was argued at the time that if water looked "clean", then it was safe. Snow examined the water for obvious dirt, and, finding nothing, let it sit for a few days, whereupon "white flakes" appeared in the water (McLeod, 2000). Though it is unlikely that this impurity had much to do with the cholera itself, it is clear that Snow suspected that something was in the water in spite of its invisibility. It is interesting to note that the water from the Broad Street pump in fact appeared remarkably more clear than the water of many of the other nearby pumps. Ironically, it was this seeming cleanliness of the water which made the Broad Street pump popular, and ultimately may have been responsible for such a high death toll. Snow also made observations regarding the self-limiting nature of cholera. As the death toll began to lessen following the removal of the pump, lending support to his theory, Snow realized that, without a continued source of infection, the deaths would decrease. More

importantly, he recognized that new cases, though far less in number, were still occurring, and deduced that these cases “must have been occasioned in the usual manner, and not through the medium of water”, meaning direct contact with contaminated feces (McLeod, 2000). In fact, Reverend Henry Whitehead, in continuation of Snow’s work, later identified the significance of the death of a small child early on in the epidemic: the child’s mother had washed his soiled diapers into a drain which was later found to have emptied into the well that supplied the Broad Street pump. Thus, while it is likely that the River Thames was indeed contaminated with cholera, the probable cause of so many of the Broad Street deaths may have been the actual pump.

Secondly, Snow’s views challenged the dominant theories of the time. The widely held belief of physicians and lay people alike was that cholera was spread through the inhalation of noxious gases (McLeod, 2000). An old burial ground of victims of the plague of 1665 existed nearby, and it was thought that industrialization, including the formation of sewers, had disturbed the grounds and released infectious gases from the bodies. This air-borne spread of disease was known at the time as “miasmata”, or “bad air”. Even the Board of Guardians, who supported Snow’s recommendations regarding the water pump, did not publicly endorse his views on the pathology of the disease which explained them. In fact, were it not for Snow’s professional reputation and good standing within the medical community, it is unlikely that his theories would have had an impact at all. The Committee on Scientific Inquiries of the General Board of Health, for instance, soundly rejected Snow’s ideas, maintaining that a concentrated noxious atmospheric gas was certainly responsible.

Finally, there remains the question of the “myth” of John Snow: the separation of fact from fiction, legend from historical accuracy. Much has been made of Snow’s spot map and the suggestion that Snow’s theories followed the forming of the map. Maps used in this manner have been described as “the highest use of cartography: to find out by mapping that which cannot be discovered by other means, or, at least, not with as much precision” (McLeod, 2000). However, there are difficulties with this theory regarding interpretation; the committee, for instance, observed the same map and reached very different conclusions. As Snow’s map has taken on such a significant focus, it perhaps overshadows other truly important contributions he has made to medical science. Given the sequence of events leading to his conclusions, it seems obvious that Snow was testing, and not forming, his hypothesis at the time the map was drawn. Though the map has clearly served a purpose in its concise presentation of data, it seems less likely that the map itself raised Snow’s hypothesis.

Snow’s contributions in the areas of anaesthesiology, epidemiology and medicine have earned him recognition and respect which is still evident today. In London, Broad Street has since been re-named “Broadwick Street”, to distinguish it from several other identically-named streets (Morens, 2000). The famous Broad Street pump is represented by a replica of a water pump with no handle, in recognition of the historically significant symbol of medical research in public health. Within view is The John Snow Pub, another tribute to Dr. Snow. Originally called the “Newcastle-upon-Tyne”, it was renamed in 1955 in celebration of the centenary of Snow’s research (Howat, 1973). Snow, ironically enough, was a teetotaler for

most of his life (Frerichs, 2001). A final tribute, Snow's grave, is still paid homage by visiting epidemiologists and anaesthetists (Macintosh, 2000).

Snow is painted as an ahead-of-his-time thinker who saw the writing on the spot map, the truth and the facts in the midst of the already accepted but erroneous theories that prevailed. The facts as we now know them show Snow not as the geographical hero the stories paint him as, but as a medical scientist with a hypothesis whose work had epidemiological consequences. An injustice is done in failing to recognize that Snow's work was guided by his own theories and borne out by science in the years to come.

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# **SANITATION ACROSS THE NATION: THE ROCKY ROAD TO COMMUNITY, HOSPITAL AND SURGICAL CLEANLINESS IN VICTORIAN BRITAIN**

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## **ABSTRACT**

The Victorian era was a time of many health care changes. These included the improvement of sanitary conditions in communities, hospital wards, and operating theatres. In 1839, a year after Queen Victoria's coronation, the British parliament ordered a national public health report because of the known association between filthy living conditions and illness. The report, published in 1849, was written by Edwin Chadwick and made suggestions about the purification of drinking water and the delivery of health care that, although not looked upon entirely favourable at first, were instituted before the turn of the century. In 1854, Florence Nightingale began to unveil the sanitary, and other, problems with Victorian hospitals. Thanks to her image as a hero of the Crimean War and her meticulous record-keeping, her critics were dismissed relatively quickly and she brought about great improvements in hospital conditions. Joseph Lister was the sanitary reformer whose efforts were directed towards surgical cleanliness. He went against the old dogma that a purulent wound was good, by developing aseptic and antiseptic techniques for surgery and wound healing with the goal of preventing the formation of pus. Lister first used carbolic acid as an antiseptic in 1865 and his techniques, and his statistics, were questioned by other prominent surgeons. Eventually, Lister's ideas were accepted and he received many honours, including being named the consulting Surgeon-Extraordinary to the Queen by Victoria herself in 1896, five years before her death. The improvement of community, hospital and surgical conditions in Victorian England met with resistance but it was ultimately successful. The practises that were in their infancy at that time have grown and changed and are now mature components of the delivery of modern health care.

Queen Victoria came to the throne after the death of her father in 1837 and reigned until her death in 1901. She was the longest ruling monarch in British history and witnessed many important world and British events during her six decades in power. As industry, business, and even the map of the world changed, health care in Britain was certainly not left behind. The emphasis on sanitary conditions in communities, hospital wards, and surgical procedures that is second nature to modern health care providers had its shaky, and resistance-met, beginnings during the Victorian era.

In 1838, the year of Victoria's coronation, the working class neighbourhoods of London were stricken with disease due to overcrowding and unsanitary living conditions. Poor people lived in filth and waterways, including the River Fleet, were used as open sewers as well as sources of drinking water (Flinn, 1968). That year, the New Poor Law Commission, a welfare system that provided financial relief to the poor, noticed that it was supporting people who were too sick, rather than too lazy, to work. There was a high rate of fever (mostly cholera and typhoid) in these unsanitary communities and the New Poor Law Commission asked Dr. Thomas Southwood Smith, Dr. Neil Arnott, and Dr. James Kay to write separate reports, for various regions of Britain, on the problem. Southwood Smith's account of an area called Punderson's Gardens mirrors his colleagues' findings. He wrote

*A long narrow street; the houses have no sunk area; and the ground floor is extremely damp. Along the center of the street is an open, sunk gutter, in which filth of every kind is allowed to accumulate and putrefy. A mud-bank on each side commonly keeps the contents of this gutter in their situation; but sometimes, and especially in wet weather, the gutter overflows; its contents are poured into the neighbourhood houses, and the streets are rendered nearly impassable. The privies are close upon the footpath of the street, being separated from it only by a partition of wood. The street is wholly without drainage of any kind. Fever constantly breaks out in it, and extends from house to house; it has lately been very prevalent here, and we have lately had several fatal cases from it in the London Fever Hospital (Southwood Smith, 1838; in Flinn, 1968, p.59).*

These doctors' reports revealed that there was an unquestionable relationship between disease and unsanitary living conditions and began the period in British history that is known as The Great Sanitary Awakening (Flinn, 1968).

Because the government wasn't convinced by Arnott, Kay, and Southwood Smith's evidence, the next step of the Sanitary Awakening was a national public health enquiry ordered by the British Parliament in 1839. Edwin Chadwick, the former secretary of the New Poor Law Commission and a radical thinker who believed that public problems could be solved using a rational and scientific approach, conducted the enquiry (Rosen, 1958). Chadwick's work was published in 1842 and was entitled *Report on the Sanitary Conditions of the Labouring Population of Great Britain*. He described the pan-British situation of poverty, filth, and disease and recommended changes believing that "The primary and most important measures [were]...drainage, the removal of all refuse of habitations, streets, and roads and the improvement of supplies of water (Chadwick, 1842)." Chadwick recognized that improving the situation would cost money but he was certain that "The expense of public drainage, of supplies of water laid on in houses, and of means of improved cleansing would be pecuniary gain, by diminishing the existing charges attendant on sickness and premature mortality (Chadwick, 1842)." Unfortunately the British government wasn't convinced that spending money to prevent disease was cost-effective and was slow to implement Chadwick's ideas. Resistance to Chadwick's proposals may also have occurred because he was not well-liked in the political arena. Parliament appeared to display its distrust for Chadwick when it established the Royal Commission on the Health of the Towns in 1843 to

ensure that his findings were correct. Bureaucracy delayed changes and unsanitary conditions continued to cause disease, including the 1851 cholera epidemic during which John Snow used a map to convince authorities that contaminated water was the source of the illness (Flinn, 1968).

As the evidence mounted, the British government gradually instituted changes. The first was the 1848 Public Health Act. The act suggested ways of improving the health of the poor but did not include any mandatory policies. The Public Health Act stated that each region could form a local board of health if one tenth of the ratepayers petitioned for it and that these boards of health could appoint medical officers of health but were not forced to do so. The Public Health Act was not stringent enough to reduce the occurrence of disease due to poor sanitation and a stricter act, the Sanitary Act, was passed in 1866. The 1866 act gave more power to local boards of health so that they were better able to prevent and treat problems. Perhaps more importantly, it also ensured adequate funds for Chadwick's proposal of universal water treatment (Flinn, 1968). Although it was ultimately successful, community sanitary reform was a long, slow process because of government resistance to it.

Hospital ward sanitary reform, on the other hand, met with only a little government resistance. Hospital conditions came to light in 1854, during the Crimean War. British soldiers were fighting alongside French and Turkish troops and being wounded in great numbers as they battled the Russians in Russia's Crimean Peninsula. Sidney Herbert, the secretary of war at the time, recognized that the nearly uninhabitable army hospitals and barracks in the Crimea were not serving the troops well and he put his friend Florence Nightingale in charge of the treatment of sick and wounded soldiers (Wain, 1970). Nightingale was a German-trained British nurse whose ideas about hygiene and sanitation were ahead of her time. When she arrived in the Crimean she was appalled at the conditions and wrote,

*The nurses did not as a general rule wash patients, they could never wash their feet – and it was with difficulty and only with great haste that they could have a drop of water, just to dab their hands and face. The beds on which the patients lay were dirty. It was common practice to put a new patient into the same sheets used by the last occupant of the bed, and mattresses were generally flocksodden and seldom if ever cleaned.* (Nightingale, 1854; in Fisher, 1977, p.237).

Upon her arrival, Nightingale directed the nurses to work in shifts around the clock in order to clean the hospital and its patients. As Nightingale and her team made the hospital cleaner, and a more pleasant place to be, the mortality rate fell among wounded soldiers and she was revered by the British people (Wain, 1970).

One reason that Nightingale was held in high regard was that she kept records that provided evidence for the effectiveness of her policies. Nightingale has been described as a “passionate statistician” (Eyler, 1979, p.161) and her meticulous record-keeping, along with creative visual displays of these records, made it clear that improving sanitary conditions in hospital wards improved patient outcomes. Nightingale drew unique pie graphs, called coxcombs, on which the area of each wedge represented hospital mortality in a month. As



the hospital became cleaner, the mortality wedges became smaller on the coxcombs (Eyler, 1979).

After the war, the highly-regarded nurse returned to England and continued to use statistics to fuel sanitary reform in hospital wards. She collaborated with William Farr, a prominent population statistician, on projects that included the newly established Army Sanitary Commission in 1857 and the Indian Sanitary Commission, which focused on the military hospitals during the India Mutiny, in 1859 (Eyler, 1979). Nightingale also turned her attentions to teaching and to the state of hospitals in Britain. At the Nightingale School and Home for nurses, Nightingale and her disciples taught nurses the importance of sanitation, warmth, light, and nutrition in the treatment of patients (Wain, 1970). She studied British hospitals and, using both her own statistics and some of Farr's, published a book called *Notes on Hospitals* in 1859. Nightingale's *Notes* compared mortality rates in different hospitals and in the third edition of it she wrote, "it cannot be denied that the most unhealthy hospitals are those situated within the vast circuit of the metropolis...and that by far the most healthy hospitals are those of the smaller country towns (Nightingale, 1862; in Eyler, 1979, p.181). She proposed that outcomes were so poor in city hospitals because of unsanitary conditions that were the result of overcrowding. *Notes* also included measures to be taken to improve in-hospital sanitation, including sprawling wards with adequate ventilation. Finally, Nightingale proposed complex record-keeping schemes so that hospitals could monitor their outcomes. Her medical records ideas were the only ones that met with resistance as hospital administrators and medical officers of health criticized the forms she developed for being too long and complicated (Eyler, 1977). Thanks to Florence Nightingale, her statistics, and her dogmatic belief that dirt led to disease, hospital wards became much cleaner places during the Victorian era.

Operating theatres also became cleaner during Victoria's reign but the path tread by Joseph Lister, the leading surgical sanitary reformer, was not as smooth as the one tread by Nightingale. Lister was a surgeon who trained in London, England and Edinburgh, Scotland and was also involved in coagulation and inflammation research using animal tissue. In 1861, he was appointed the head of the new surgery unit at the Glasgow Royal Infirmary and surgeries in Glasgow were plagued by the same problem as they were across Great Britain – wounds healed poorly and patients often died of post-operative sepsis (Fisher, 1977).

From his inflammation work and observation of his patients, Lister had surmised that purulent wounds were indicative of infection and that the source of infection was the air. Lister's idea that pus was not an integral part of the body's natural healing process was contrary to the teachings of the time that echoed the sentiments of the surgeon William Savory. In a speech, Savory said that he was "neither ashamed nor afraid to see well formed pus covering the surface of granulations" and that "as a rule, the condition [of the wound] is satisfactory under a layer of laudable pus (Savory, 1879; in Fisher, 1977, p.130). When Lister learned of Louis Pasteur's work with air-borne bacteria and fermentation, he was certain that it was connected to his own and decided that bacteria were likely the source of infection in wounds (Rosen, 1958).

Lister's next step was to prevent bacteria from entering surgical incisions and compound fractures and he did so by developing an antiseptic principle. In 1865 he began preparing a carbolic acid putty that was placed directly on the site of injury and in which dressings were soaked. The carbolic acid killed bacteria before it entered the wound. There is disagreement over how he chose carbolic acid, but he likely chose it either because French and German doctors were using it as a disinfectant or because the town of Carlisle was using it for sewage treatment (Fisher, 1977 and Rosen, 1958). His first success was with the compound fracture of an 11 year-old boy named James Greenlees and by 1867 he had published accounts of 10 other cases. As the cases mounted, Lister perfected his technique so that it became one of not only antisepsis but also primitive asepsis. He sprayed operating theatres with carbolic acid using a pump called a donkey engine and had surgeons wash their hands in carbolic acid (Fisher, 1977).

Because Lister's emphasis on surgical sanitation was a marked departure from Victorian medical thought, he faced, but ultimately overcame, many critics. Aside from still believing in 'laudable pus', surgeons of the day thought that carbolic acid was too damaging to skin; that preparing Lister-style dressings was too time consuming; and that Lister's cases did not provide sufficient statistical evidence for the effectiveness of his new routine (Fisher, 1977). As Lister used his antiseptic principle to treat more and more patients, the evidence mounted and his critics were quieted. By 1880, his ideas were accepted enough that he was elected to the Council of the Royal College of Surgeons. Queen Victoria had a great deal of respect for Lister and in 1896 appointed him as a Surgeon Extra-Ordinary, a consultant to the royal family. When Victoria died in 1901, Lister was at her side as the Sergeant-Surgeon to the Queen and the surgical sanitation practices that he instituted had been fully accepted (Fisher, 1977).

Surgical, hospital and community sanitary reform in 19<sup>th</sup> Century Victorian Britain altered medicine forever, despite initial opposition to some of their propositions. When sanitary reform was born, in British slums, the government was slow to support it but by the time the reform reached middle age and had moved into surgical suites the Queen of England gave it her blessing. It took more than sixty years to develop improvements in sanitation but the changes, and others that were to follow them, have contributed significantly to health care since. Sanitation is likely to remain a constant component of health care and reformers like Chadwick, Nightingale, and Lister are to be thanked for introducing it to the medical community.

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# THE AFFAIR OF THE ITCH: DISCOVERY OF THE ETIOLOGY OF SCABIES

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## ABSTRACT

Scabies ran rampant throughout Europe during the seventeenth, eighteenth, and nineteenth centuries. A disease of many names, it was known as the *itch* in England; in France, it was called *la gale*. While it was commonly associated with people of the poorer classes, important personages were not immune to its influence. Indeed, Napoleon I was thought to have suffered from it for most of his life.

Early theories of the time postulated that transmission of the itch was due to a miasma generated by poor hygiene, or an imbalance in the bodily humours. Spontaneous generation was also a commonly accepted doctrine. In 1687, Bonomo provided the first accurate description of the itch mite and suggested it as a possible cause of the itch. In 1812, Gales demonstrated the extraction of the mite from the pustules of a scabetic patient. However, both discoveries were soon forgotten or discredited by their contemporaries. Having gone through several such permutations, the etiology of the itch seemed no closer to being discovered. The causal link between the mite and the itch remained elusive due to difficulties in viewing and locating the mite. Ultimately, the final clue came from a Corsican medical student's observations of the washerwomen of his country. Twenty-three years after Gales was accused of rigging his demonstration, Renucci demonstrated a replicable technique for extracting the mite by removing it from the tunnels created by its passage through the skin, rather than from the pustules.

With this discovery, the theory evoking *Sarcoptes scabiei* as the etiologic cause of scabies began to gain widespread recognition. In doing so, it marked a new era in medicine, demonstrating for the first time that a microscopic organism could be the cause of a disease.

When one pictures Napoleon Bonaparte, the image that immediately leaps to mind is one of a man standing proudly erect, with his right arm tucked into his waistcoat. Despite the regal stance, the great emperor was likely scratching. At a time when scabies ran rampant throughout Europe, Napoleon I was thought to suffer from this severely pruritic disease. Of course, the cause of scabies, or the "itch", was not known at the time, and it would be nearly

two centuries later before it would be discovered. Meanwhile, the little mite known as *Sarcoptes scabiei* would wreak havoc among both the poorer classes and the rich.

### **Scabies in Ancient Civilizations**

Scabies was familiar even during ancient times. In the ancient Chinese and Indian civilizations, the mite and scabies were observed independently, but no link was ever made between the two. Due to the mysterious nature of the disease, the itch was thought to have been sent by deities or demons. Those afflicted attempted to pacify the deities responsible or turned to the priesthood for help.

In ancient Greece, the focus shifted from a spiritual nature to a more philosophical one. Aristotle was the first to name the wood mite, a cousin of the itch mite. Considering it the smallest indivisible living organism (a living atom of sorts), he gave *Sarcoptes scabiei* the moniker “acarus.” Meanwhile, Hippocrates believed that all diseases resulted from an imbalance in the four bodily humours: blood, phlegm, black bile, and yellow bile. In particular, he believed that scabies, together with leprosy and prurigo, resulted from a disturbance of phlegm. Galen also followed the humoral theory, suggesting that scabies was promoted by black bile and melancholy humour. In addition, he further enlarged upon the theory, postulating that disturbances in the skin reflected an internal malady. Indeed, the pustules seen in scabies were thought to be eruptions produced by the escape of bad humours trapped inside the body. Release of these humours was seen as positive, as their entrapment could lead to more severe diseases of the internal organs.

### **The Middle Ages**

Due to Galen’s influence, the humoral theory dominated medical thought throughout the Middle Ages. Consistent with a belief in an internal cause of the itch, remedies were administered internally. In Arabian medicine, the diet was thought to play a large role in the acquisition of the disease. Scabies was often ascribed to the eating of “hot, dry foods”, which in turn disturbed the balance of humours. The Arabian physician Avenzoar noted that a small “animal” could be seen in scabetic patients if a portion of the skin was peeled away. As a result, he recommended mite killing as a form of treatment. However, it is clear that he too was a supporter of the humoral theory, as he cautioned patients to avoid fresh fruit, particularly figs.

### **The Seventeenth Century: Almost but Not Quite**

A major breakthrough in the discovery of the parasitic origin of scabies occurred in 1687. Giovan Cosimo Bonomo, a young naval physician, and Diacinto Cestoni, a pharmacist and expert microscopist, had been collaborating in their studies of the itch mite over the course of two years. Together, they studied the mite, noting its morphology and physiology. In July 1687, Bonomo wrote a letter to Francesco Redi containing the first accurate description and drawings of the itch mite. In his letter, Bonomo stated:

*It is very probable that this contagious disease owes its origin neither to the melancholic humor of Galen... nor the irritating salts in the serum or lymph of the moderns, but is no other than the continual biting of these animalcules in the skin, by means of which some portion of the serum oozing out through the small apertures of the cutis, little watery bladders are made, within which the insects continue to gnaw, the infected are forced to scratch...*

Bonomo also described the contagious nature of the disease, suggesting that the tiny size of the mites allowed them to be transmitted via direct contact or articles of clothing.

While this may have seemed a very convincing argument for the parasitic origin of scabies, it was not enough to overcome the impetus of Galen's reputation and the humoural theory. It is important to note that the seventeenth century was an era in which two opposing forces dominated: that of the innovator and that of the Church. Shortly after Bonomo wrote his letter, his ideas ran into conflict with the Church, which remained firmly entrenched in the humoural doctrine. Giovanni Maria Lancisi, the Pope's chief physician, strongly disagreed with Bonomo, believing that the itch mite appeared only after a humoural imbalance produced the disease. Using his position, Lancisi was able to dissuade Bonomo from continuing the dispute, perhaps making reference to the fate of Galileo, 55 years earlier. As a result, the scientific community soon forgot Bonomo and Cestoni's discovery.

### **The Eighteenth Century: History Repeats Itself, Again and Again...**

Over the next century, many physicians would repeatedly demonstrate proof of *Sarcoptes scabiei* as the cause of the itch. However, due to the lingering effects of Galen's authority, these discoveries were usually ignored or questioned. Works by Richard Mead, John Hunter, and Sir John Pringle discussed the itch mite as the cause of the itch. External treatments, such as sulphur ointments were recommended, paralleling the idea that scabies was merely a skin disease and not a result of inner sickness. In 1786, Johann Ernst Wichmann published a monogram entitled *Aetiologie der Krätze*, in which he described the disease and the itch mite, as well as the location of the mites. He concluded his monogram by stating:

*I hope I have now thoroughly explained and proved the etiology of scabies, or at least rendered it both plausible and logical that it is a simple skin disease caused by mites... The presence of the insects, the cure of the disease by external means, the futility and lack of need of any internal medication, together with the fact that, in this disease one can enjoy a free choice of diet; all of these phenomena are... in favour of its parasitic origin.*

Despite the testimonies of such distinguished physicians, the medical community remained unconvinced. Instead, physicians focused on the perceived association between poverty and the itch. Scabies was seen to have arisen from lack of cleanliness and poor living conditions. Indeed, the French physician Anne Charles Lorry listed the causes of scabies as cold damp air, poor food, bad water, and general filth.

## **Conflicting Theories**

From the sixteenth to the eighteenth century, a number of theories regarding the cause of scabies waxed and waned in influence. As mentioned previously, the humoural doctrine, first initiated two thousand years earlier, continued to hold sway in the scientific community until the beginning of the nineteenth century. Meanwhile, infectionist theories postulated that the itch was transmitted by a miasma created by poor hygiene. Those who breathed such “bad air” would be stricken by the illness. Also prevalent at the time was the theory of contagion, an early precursor of the germ theory, which stated that the itch was transmitted via tiny particles in the fluid contained in the pustules. Passage of these particles from those afflicted to the healthy resulted in disease.

It was during these turbulent times, that the acarian theory slowly began to gain supporters. While many agreed that there existed an association between the scabies mite and the itch, few believed it to be a causal one. Some, like Lancisi, thought that the mite was a secondary effect of the itch, appearing as a scavenger of diseased skin. Closely intertwined with this theory was the idea of spontaneous generation. Just as flies were thought to arise spontaneously from rotting meat, the itch mites were thought to arise from diseased flesh. Meanwhile, others acknowledged that while the mite was a sufficient cause of scabies, it was not a necessary one. Indeed, some scientists distinguished between two types of scabies, one caused by the itch mite and another entirely unrelated to the mite. Only the acarian theory suggested that the mite was both necessary and sufficient to cause the itch.

## **Scandal at the St. Louis Hospital**

Towards the end of the eighteenth century, the number of cases of the itch began to grow rapidly in France, prompting the conversion of the St. Louis Hospital in Paris into a hospital for skin diseases. Jean-Louis Alibert, a young physician and ardent supporter of the acarian theory, was appointed the Chief Medical Officer of the hospital. Alibert was convinced that the itch had a single cause: the acarus... Poor living conditions did not cause the itch, but rather served to perpetuate the condition. During his time at the hospital, he created an intellectual refuge for the acarian theory.

In 1812, Jean-Chrysanthé Galés, a pharmacist attempting to graduate as a physician, approached Alibert concerning a topic for his thesis. With some humour, Alibert suggested that he study “la gale”, or the itch as it was called in France. Following his studies, Galés claimed to be able to extract the mite from the vesicles of a scabetic patient, and on August 21, 1812, gave a public demonstration. Before the eminent authorities and physicians of the time, he removed the epidermis from a scabetic pustule and extracted the mite contained therein. The famed French artist Meunier made a drawing of the mite, and the controversy surrounding the parasitic origin of scabies seemed to have ended.

However, in the years following the demonstration, scientists were unable to replicate Galés’ results. Alibert himself tried again and again to extract the mite but to no avail. Critics of the acarian theory, led by Jean Lugol, another protégé of Alibert, began to doubt the authenticity of Galés’ demonstration. French medical journals printed articles accusing Galés, and

indirectly his mentor, Alibert, of rigging the demonstration. In 1821, Ignace Mouronval noticed a suspicious similarity between Galés' itch mite and the common cheese-mite. Consequently, Lugol offered 300 francs to any person who could indisputably produce the mite. Galés was completely discredited when François-Vincent Raspail took Lugol up on his offer and seemingly demonstrated the extraction of the scabies mite from a scabetic pustule. Following the demonstration however, he revealed how cheese mites taken from a lump of cheese in his pocket could be substituted for the itch mite. Raspail's betrayal dealt a severe blow to the acarian theory. By 1829, not only the mite as the cause of scabies, but the very existence of the mite itself, was being questioned.

### **Redemption and an End to the Controversy**

It was not until five years later (1834) that the acarian theory emerged from hibernation. A young Corsican medical student by the name of Simon François Renucci remembered the practice of the Corsican market women of removing mites using needles, a practice that had been in existence among the peasantry since the early seventeenth century. On August 13, 1834, Renucci was able to immediately demonstrate the removal of the scabies mite from a patient with scabies to Alibert. Furthermore, he was able to repeat his performance with the same success. Five days later, Lugol challenged him to perform a public demonstration, repeating his offer of 300 francs.

Consequently, on August 20, 1834, a second public demonstration was performed. Renucci inserted a needle not into the scabetic pustules, but into the burrows close by, and removed a small oblong creature on the tip of his needle, thereby winning the prize. This event marked a turning point in the history of scabies. Scientists were now able to extract and study the itch mite, setting in motion the final experiments that would flesh out the acarian model.

### **Conclusion**

Thus, the history of scabies has been a long and tumultuous one, with significant advances forgotten and in need of discovering many times over before finally being accepted. As has frequently occurred in the past, medicine clung to the coattails of previous well-loved theories, hindering their timely exit and preventing newer theories from replacing them. In this manner, a discovery that could have been made as early as the seventeenth century, with the advent of the microscope, was drawn out some two hundred years longer. Indeed, even general knowledge surpassed the snail's pace of medical advancement, with the final clue in the scabies puzzle provided by Corsican peasant women. Nevertheless, the discovery of *Sarcoptes scabiei* as the cause of scabies marked the turning of another page in the annals of medicine, being the first time that a living organism was shown to be the cause of a disease, and setting the foundation for the future acceptance of the germ theory.

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# SMALLPOX IN THE ABORIGINAL PEOPLE OF RUSSIAN-AMERICA

By

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## ABSTRACT

**The frailty of Arctic aboriginal people's health had been demonstrated as early as 1577 when Martin Frobisher brought back Eskimos to England, only to have them die within two months of arrival. Even though the aboriginal people of the Alaska area had health problems prior to Russian contact, their health worsened the more they became integrated into the economy of the Russian-American fur trading company. The company did make an announcement to vaccinate all Russians and as many aboriginal people as possible but little action was taken until 1835 when smallpox swept through the region. The aboriginal people's suspicions and traditional beliefs in shaman died off with those individuals who continued to reject the vaccine. The vulnerable population was told the epidemic came at the cost of ignoring the Orthodox Church. An acceptance of Russian superiority grew amongst the surviving population and some non-aboriginal people even declared a new era of enlightenment. The Russian-American company further contributed to the problems by building common settlements with food storage and livestock. Smallpox claimed the lives of up to fifty percent of the aboriginal population in only seven short years. Of much more importance than the numbers are the thoughts, actions, and justifications of the Russians and the aboriginal people's reactions. Each region had its own timeline, source, and mortality rate of the disease but the commonality was the loss of faith in their religion, culture and future.**

One of the greatest advancements not only in medicine but also in humanity was marked by the 1980 final report of the global commission for the certification of smallpox eradication. Smallpox has claimed the life of millions in every corner of the globe since its first descriptions in India around 1 BC (Hopkins 1983). Despite a late appearance and short stay of smallpox in the region today known as Alaska, the virus forever changed the lives of the aboriginal people. The sensitivity of arctic aboriginal people's health had been seen as early as 1577 when Martin Frobisher repeatedly tried to bring back Eskimo people to England only to have them die within two months (Fortune 1981). The extinction of the Huron population due to smallpox would be a much better illustration of the number of aboriginal lives lost (Clark 1981); however, the focus is to remain on the thoughts and actions of the Russians along with the reactions of the aboriginal people at a time of rapid change during the outbreak. The offering of vaccinations to the aboriginal population was an indicator that the Russian-American Company's goal was not one of oppression. Regardless of the end result,

the aboriginal people were recognized as a necessary component to the functioning of the company even if they were at the bottom of the hierarchy. One other important focus will be the long-term effects the virus has had on the aboriginal people's traditions, attitudes and ways of living.

It is important to understand the background of the Alaskan aboriginal people and their balanced existence before one can understand how smallpox affected them. Some estimates state that there were approximately 80,000 pre-contact Alaskan aboriginal people (Langdon 2001). As the nomadic people did not have a written history of their own, the historical information available is often based on the early explorers' diaries, which describe the aboriginal populations inaccurately and with much prejudice. Many devaluing remarks and observations were made without an effort to understand the people or even approach them (Fortune 1981). With respect to health information only very obvious deformities and problems would be noted, and even then the remarks were very basic, as the explorers did not have specific medical knowledge. In the Alaskan aboriginal populations a shaman provided all forms of treatment including medical treatment. A shaman was a member of a tribe or community who had contacts with both the spiritual and physical world and would provide physical and psychological healing therapy, teachings, and advice. These services were provided with the use of a variety of items such as dance, drums, snow, animal oils, and meditation amongst other things. Outside observers of spiritual ceremonies have described a shaman's work as mass-hypnosis (George 1978).

One common misconception that must be shattered is that all diseases were brought by outside contact and that the aboriginal people previously had unremarkable health. Health descriptions of the aboriginal people made by multiple early observers, in various regions, in different times have much similarity. Practices like using seal oil for treatments, casually wiping blood on their sleeves, and spitting on one's hands then wiping it on another for a greeting are just some of the actions that were seen as unhygienic. Some other common descriptions are of lice, worms, constant nosebleeds, ear infections, as well as many eye problems and respiratory problems (Fortune 1981). Because of their close association with animals, zoonotic infections were likely and life expectancy must have been low, as few aged people were observed. Paleopathological studies done on mummies and skeletal remains of Eskimos and Aleuts also support the fact that they were not disease free. Evidence has been provided for presence of parasitic infections, lobar pneumonia, bronchiectasis, fungal infections, and bacterial infections like streptococcus and staphylococcus in pre-contact aboriginal people (Keenleyside 1998).

The first people to discover the Alaskan region were the Russians in 1741. Fur traders came in very quickly but the first permanent settlement was not established until 1784 on Kodiak Island (PageWise, Inc. 2000). The integration of the aboriginal people into the Russian commercial system exposed them to more outside contact resulting in increased health problems due to the lack of specific immunity. Documented links are made between what were described as violent colds amongst the aboriginal people and the arrival of the commercial trading ships (Fortune 1981). The Russian-American fur trading company likely started around 1790 and dominated the Alaskan region until the region was sold to America in 1867. Over-killing, working until exhaustion, competition, along with increased outside

contact were new components the trade brought to the lives of the aboriginal people. These traits allowed for the economic success of the company by exporting 905,585 furs and other products between the years 1821 through 1842 (Tikhmenev 1978).

In 1787, Captain Nathaniel Portlock extrapolated that the first incidence of smallpox in Alaska must have been around 1775 based on the typical scars seen with smallpox and the age of the youngest scarred person in a Koloshi community (Fortune 1985). The source was likely from one of the northwestern Indian tribes who had been fighting with the virus since the early 17<sup>th</sup> century. The aboriginal people considered smallpox a punishment sent down by an evil spirit in the form of a massive raven who dwelled on distant mountain peaks (Tikhmenev 1978). It was soon after smallpox had killed a group of Creoles headed to Russia, that the Russian-American headquarters specifically and clearly requested a vaccination program for all Russians and as many natives as possible in the Alaskan area (Fortune 1985). Very few aboriginal people accepted the vaccine as most were suspicious of the intentions of the Russians; they had confidence in their shaman. In the twenty-one years after the 1808 announcement only 500 aboriginal people were inoculated (Fortune 1985).

It was the fall of 1835 when smallpox swept through the Alaskan region starting in the east. The susceptible aboriginal population was as a whole hard hit, but each community region had their own outcome based on many factors such as geographical location, involvement with trade, and relations with the Russian people. A controllable factor that could have greatly altered the outcome of the infection was the acceptance of vaccinations. In the first year of the epidemic, 3000 aboriginal people died before a full-fledged vaccination effort was attempted (Bancroft 1886). As the epidemic spread, Dr. Blaschke, the chief medical officer, scrambled in an effort to immunize whomever he could; however, much of the effectiveness of the vaccination program was to be determined by the aboriginal people, as they still had the decision to accept or reject the vaccine.

The Koloshi (also known as the Tlinget) population was described as an independent, fearless, stubborn group with a pure hatred towards Russians (Veniaminov 1972). With a description like this, it is not too surprising that the group rejected vaccinations and maintained that their shaman knew best. In the months of January and February 1836, the Koloshi were losing eight to twelve people per day and as panic set in many fled to other neighboring villages, often harboring the virus during its incubation stage (Fortune 1985). The shaman's common remedies of snow and ice were completely ineffective. What was even more frustrating to the Koloshi people was that not a single Russian had gotten infected even after the group was praying to the spirits, known as eky, to deflect their illness onto the Russians (Veniaminov 1972). At a time of unexplained occurrences, worries, and search for new meaning, the surviving Koloshi people were in a very vulnerable position. Father Veniaminov was one of the many people to take advantage of his newly gained position as he brought forth the Orthodox message as a solution to problems. Veniaminov inferred that the outbreak was a result of divine displeasure at the aboriginal people's lack of commitment to him and the Orthodox faith (Fortune 1992). Those who accepted the faith were given, for a short while, full emotional, financial, and medical support and those who rejected were left to deal with their own problems. After painfully seeing the death of one's own family, many of

the surviving Koloshi voluntarily went to the Russians for vaccinations. This was an absolute turning point, as this marked not only the acceptance of the superiority of Russian medicines but of all things Russian including religion, technology, and race (Fortune 1992).

The smallpox infection was actually considered a good thing by many non-aboriginal people. Reasons stated were that the surviving population would be much more compliant, less able to mount a rebellion and therefore would not be able to interfere with the extension of commerce (Houston 1974). Other 'benefits' of the outbreak were those aboriginal people with feelings of hatred towards Russians and with strong traditional beliefs, died along with their ancient 'non-progressive' ways of thinking (Veniaminov 1972). The theme was further extended and went so far as to say that a new age had been entered seeing the end of the aboriginal people's savagery and ignorance and the beginning of their enlightenment and humanness (Fortune 1992). The Russian-American Company may have shared some of these beliefs, but they could not afford to see other regions undergo the same loss that the Koloshi had seen, as it would jeopardize the company's economic productivity. Company guidelines were soon developed by chief manager Kupreianov on how to prevent the spread of disease along with directives for vaccinations, passage of ships, and isolation (Fortune 1985).

Regardless of precautionary measures, another epidemic broke out in Kodiak on July 8, 1837 killing 736 aboriginal people, which was an estimated one third of the group's population (Hopkins 1983). Although there may have been some resistance to the vaccine, the true issue was that the vaccination effort was started way too late to have had any efficacy (Fortune 1985). Dr. Blashke was determined to not let this happen again so he strongly encouraged the administrators to continue the vaccination campaign. Missionaries were at this point involved with administering the fresh vaccinations allowing for further assimilation of the aboriginal people. In the Unalaska district, 1086 Aleut people were willingly vaccinated and when smallpox struck in August 1938, only five of these people died (Tikhmenev 1978). In the very northern Alaskan peninsula region, an employee named Kostylev almost forcefully vaccinated 243 people but the results were still desirable, not a single mortality among this group (Tikhmenev 1978). Most regions did not have the good fortune to see results like those in the peninsula. In the regions of Cook Inlet and Prince William Sound the people's resistance to vaccination resulted in a high mortality rate just like at St. Michael Redoubt, where only 19 people survived the outbreak (Bancroft 1886). In Yukon-Kuskokwin, the rejection to vaccination was so fierce that the Eskimos actually rebelled and burned down a Russian post, as they believed that Russians were deliberately giving the disease to their people (Oswalt 1980).

The smallpox epidemic fizzled out around 1841 after seven treacherous years and multiple casualties. In the years 1835-1841 a reduction of up to fifty percent of the aboriginal population may have taken place and even in a more cooperative group like the Aleut, the population dropped from 6864 to 4007 (Bancroft 1886). It must be remembered that numbers given are likely inaccurate as the company paid attention only to financial figures and not to population figures. Regardless of the numbers given, realistic figures would include many more indirect deaths attributed to causes such as starvation, lack of leadership, suicide, and susceptibility to secondary infections (Clark 1981). In the post-epidemic years

chief manager Etholen continued to promote a regular vaccination program for the much more compliant aboriginal population. As years went by the program was less emphasized and considered more a nuisance than anything else. Luckily, when smallpox did reappear in 1862 immunity was high enough that no major effects were recorded (Fortune 1985).

In 1864 Tikhmenev completed the book A History of the Russian-American Company sponsored by the company itself in order to promote and glorify its own history. In the book, when discussing reasons for the rapid spread of smallpox, the aboriginal people are blamed for their untidiness, filthy clothing, and excess indulgence in diet. The board of directors felt they had to take immediate measures to improve the living conditions of the aboriginal people. As an illustration of the type of help that was offered, Captain Etholen did the 'service' of placing all 1375 Kodiak Aleut people of a large geographical district into common settlements. The Kodiak region's aboriginal people used to move freely between sixty-five places but were placed in only seven settlements. The settlements were built at company expense and were described as large, spacious, and well lighted. What was even more damaging to the aboriginal way of living was the settlements had large areas for food storage, sheds for hunting supplies, and space for livestock. The benefit to the aboriginal people for such an arrangement was explained as under these conditions local administration could make sure that all aboriginal people were being paid their deserved amounts. Another reason given as to why the settlements were important was that the arrangement would allow the aboriginal people more frequent interaction with priests and opportunity to learn the law of God. The author, Tikhmenev, emphasizes this portion as particularly necessary due to the character of the Kodiak region's inhabitants. The decision to have settlements was not purely done in the aboriginal people's interest but was done to gain some control on their lives. A new world was introduced to the surviving aboriginal people involving a new diet, new equipment, new care providers, new religion, altered value systems with different goals and a sedentary lifestyle. Such drastic sudden changes led to feelings of loss of identity and direction. As everything was being provided to the aboriginal people, control was beyond them. Soon after the establishment of settlements, even clothing had to be provided to the aboriginal people. A feeling of control over one's life is essential to maintaining hope and faith. The true impact that smallpox had on the Alaskan aboriginal people will never be known, but what can be said is that traditions, faith and dreams were changed as a result of the virus. Smallpox could be said to have had the role of a catalyst in the assimilation process of the aboriginal people.

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# **CHOLERA OUTBREAKS – HAVE WE LEARNED FROM THE PAST?**

By

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## **ABSTRACT**

**Several years of intense Irish immigration into Canada from 1800-1860 were accompanied by outbreaks of serious infectious disease, in particular 1832 and 1847. The purpose of the project was to determine the specific health determinants that made the Irish immigrants more susceptible to cholera and typhus during these time periods. A search and review of available data was conducted using medical journals, immigration records, published death tolls for major cities, graveyard records, hospital records and modern secondary sources. It was found that certain conditions tended to exacerbate the outbreak of both cholera and typhus, e.g. poverty, sub-standard sanitary practices, densely built small dwellings, limited health care, and ineffective quarantine measures. A final comparison was made to the 1991 cholera outbreak in Peru.**

## **Introduction**

The period from 1830-1860 was one of great change within the Canadian colonies due to exponential population growth and a huge influx of European immigrants. From 1832 onwards, the Irish made up a large percentage of the immigrants entering Upper Canada, Lower Canada, and the Maritime provinces; therefore, they were used as the central group of study in determining the role and consequences of human migration on the outbreak of infectious diseases. A final comparison was made to cholera outbreaks in Peru and Brazil, which occurred under similar circumstances. The conditions surrounding these modern outbreaks suggest that certain social and economic determinants are just as important as biological determinants in the development of disease outbreaks.

There are many factors that can be highly influential in the spread of contagious illnesses. The housing provided to certain populations, public sanitation, social assistance, non-discriminatory hiring policies and other social privileges influence the environment that individuals inhabit, and therefore, their exposure and susceptibility to infection. Food availability and agricultural production affect the degree of malnutrition and disease resistance in a population. Medical knowledge and the availability of adequate care facilities also influence how a disease will unfold within certain segments of a population.

The factors that were investigated in this project included quarantine measures, hospital conditions, sanitation, economic conditions, population density, adaptation to new territories,

and housing. The main cities of interest were Toronto (previously York) and Hamilton in Ontario and Saint John, New Brunswick since all three cities had notable typhus and cholera outbreaks. The general hypothesis of this paper is that there were particular circumstances that made the Irish immigrants more susceptible to cholera and typhus, which in turn resulted in epidemics as they migrated to Canada in large numbers. The main goal of the project was to create a historical model for studying the implication of various stressors on the health of the migrant population.

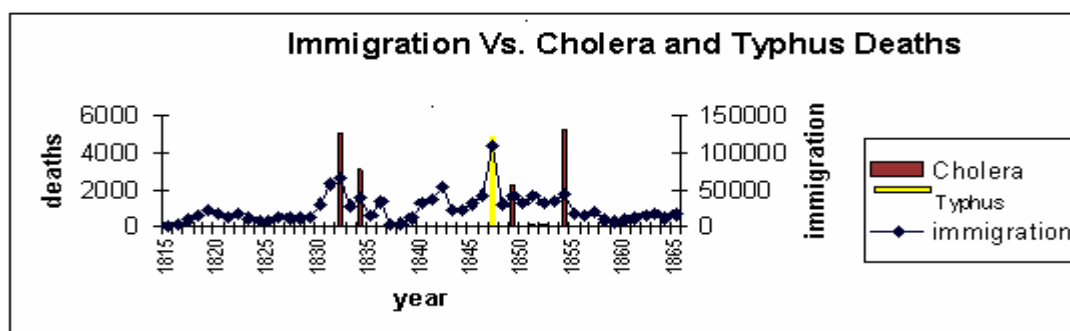
## Methods

A search and review of available published data was done using the following strategies. Search words: Irish, immigrant, cholera, typhus, quarantine, outbreak, epidemic. The literature was found using Medline searches, archival searches in all three localities, books by modern authors on Irish immigration, graveyard data, old newspaper clippings and scientific journals from the time period of interest or shortly after.

Many of the research sources were of a subjective nature, and they were helpful in discerning the experiences of the immigrant population. Such information made it possible to gain an appreciation of relevant health determinants of the time. There was much difficulty in acquiring accurate health records for the period in question since persons were not reporting illness or death, physicians were not keeping their records in order, and many physicians themselves were falling ill (Godfrey, 1968). The overwhelmed and chaotic nature of the hospitals during the outbreaks undoubtedly played a significant role in the lack of accurate statistics for many periods of cholera and typhus outbreak.

## Results

This figure presents a comparison of disease outbreaks during major immigration periods into Canada. (Godfrey, 1968; Statistics Canada, 2000; Evans, 1970)



Clearly, typhus was associated with the huge influx of immigrants in 1847. In 1832, a fairly large number of immigrants entered the country and this resulted in a serious outbreak of cholera. By 1832, most of Europe had been exposed to cholera at some point during the second pandemic that took place between 1826 and 1837 (O’Laighin, 1988) and this disease was carried with the immigrants to the new North American colonies. There was another cholera pandemic from 1846-1862 (O’Laighin, 1988), which affected many parts of Europe,



and was again brought to the North American colonies through mobile human populations. Several other types of analysis, e.g. examining the age distribution of cholera victims and country of origin using Hamilton Graveyard records, and comparisons between factors surrounding each individual outbreak were made; however, they were only discussed in more lengthy versions of this project.

## **Discussion**

In Canada, the disease outbreaks made life very difficult for the Irish emigrants. Since they were considered to be the main transmitters of the cholera outbreaks, it was very difficult for them to find employment in Canada and the northern parts of the United States. A large proportion of the Irish immigrants arrived in Canada with no capital and were employed as casual labour in the 1850's (Thornton and Olson, 1993). Within 50 years, however, the Irish community generally improved its economic status ( Thornton and Olson, 1993).

In rural Ireland, apart from the landlords, there were three main classes of people: (a) the small farmers, who were the largest class, (b) landless laborers and cottiers who rarely had more than an acre of land on a single year's lease and (c) rural craftsmen e.g. blacksmith, shoemakers, carpenters (Mannion, 1974). The small farmers and their sons were those who left in great numbers. Even when migration was at its peak due to the famine, farmers still dominated those who emigrated. In many communities, the vast majority of Irish immigrants in each area were involved in commercial agriculture (Mannion, 1975). The success of the new farming communities undoubtedly had an effect on the economic position of the new immigrants, and consequently, had impacts on the resources they could obtain.

The town of York was a large and modern city in Upper Canada, but its municipal water supply was quite unsanitary. The majority of the citizens in the town received their drinking water from the bay; yet dead animals, manure, and rotting food were heaped on the ice in the winter, and then dropped down into the water (Godfrey, 1968). It should be noted that sewage treatment was fairly rudimentary at this time, as waste matter was frequently deposited in specified fields (Guillet, 1946). For those who did not live near springs, creeks or other natural sources of water, barrels were delivered to their homes, or they had private wells or used public pumps (Godfrey, 1968). The lack of sanitation in York likely contributed to the rapid spread of the disease throughout the immigrant and extant population, since it appears as though contact with contaminated biological waste was unavoidable for many citizens.

Although the symptoms of cholera were well documented, the exact method of infection was unknown (Brigham, 1832). As a result, there was a wide variety of treatments for cholera; unfortunately, many of these methods had little effect. During the early cholera outbreaks, the medical community was very interested in the prospect of treating the illness with intravenous injections. Dr. Sampson, the principal practitioner in Kingston during the 1832 cholera outbreak, injected saline fluid into twenty bad cases, and was unsuccessful in each instance (Godfrey, 1968). In 1832, The Lancet proposed injecting highly oxygenated salts into the venous system (Godfrey, 1968).

In addition to treatment of patients, members of the medical community made many recommendations for prevention. For example, it was strongly suggested that tar should be burned in the street and that cannons should be fired frequently. Both of these practices were carried out regularly in Montreal; however, whether or not these measures were regarded as successful is not known (Bilson, 1980). Various types of food were considered potentially dangerous; for example, fruit and shellfish were commonly avoided (Bilson, 1980). Interestingly, it was also firmly believed that cholera was a disease of those who ate or drank too much; thus temperance was advised as a preventive measure.

It is likely that cholera would have arrived in Canada even if there had not been a great wave of immigration, simply because of the frequent trade voyages across the Atlantic. What will never be known, however, is exactly how great the scourge of cholera would have been in Canada had it not been for this large influx of primarily Irish immigrants. Many of the immigrants came from areas where the disease had become quite prevalent (MacKay, 1990), and the spread was of course augmented by the crowded and unsanitary conditions upon the vessels, and the disastrous conditions they faced at the overwhelmed quarantine stations like Grosse Isle and Partridge Island. With the exception of 1847, a year of widespread famine in Ireland, 1832 was the heaviest year for immigration into Canada (MacKay, 1990). It is also interesting to note that there were other years of heavy migration that showed comparatively insignificant cholera and typhus outbreak, i.e. 1837, 1841-43. It is clear though, that the two heaviest years in terms of migration, 1832 and 1847, were associated with cholera and typhus, respectively, at epidemic proportions, as can be seen in figure 1. After 1848, increased tax rates were established to restrict the amount of immigration into Canada, and this was successful since the extraordinary immigration peak of 1847 was never repeated (Houston and Smyth, 1990). The 1847 typhus outbreak was greatly accentuated by the poverty that existed in Ireland before the outbreak, the unsanitary and cramped conditions on the voyage itself, and the poverty that many immigrants faced when they first arrived in Canada.

In Great Britain, action was taken to prevent the spread of cholera to the New World. On March 27, 1832 orders were given that ships transporting more than fifty individuals had to be assessed by a surgeon before leaving, had to have adequate medical supplies, and had to employ sanitary precautions, such as daily cleaning the bedding of the sick (Godfrey, 1968). Unfortunately, it was feared that such measures would hinder emigration, and therefore received much opposition. By June 7, 1832, this order was retracted and ships could be cleared with only "an examination of all passengers prior to sailing" (Godfrey, 1968). In addition, such precautions required effort by the shipowners, who seemed to exhibit little concern for their passengers (Godfrey, 1968). The failure of adequate sanitary measures to be employed on the vessels undoubtedly contributed to disease transmission. Such regulations likely had devastating consequences during subsequent typhus outbreaks; for example, typhus could have been controlled to some extent since the lice that spread this illness were easily transmitted through the linens or clothing of infected persons.

In 1832, it was virtually impossible for cholera to be contained within the small facilities at Grosse Isle, the quarantine station that was erected to care for sick immigrants and restrict their entry into Canada. Due to lack of adequate staff, the workers at Grosse Isle were not

able to do more than make simple inspections and separate the sick passengers from the others during peak periods. Since the medical staff was often limited to less than 5 doctors, it was very unlikely that every individual received adequate health inspections or medical treatment (Bilson, 1980). The Saint John, New Brunswick quarantine station on Partridge Island had similar problems during the outbreaks.

Although cholera is largely a disease of the past in North America, it is rampant in certain parts of the world. Since 1961 the human population has again been exposed to the 7<sup>th</sup> cholera pandemic that has attacked the world since 1817 (Nations and Monte, 2000). The symptoms of the disease and its means of transmission remain unchanged, as do the conditions that allow it to propagate at an alarming rate. Cholera is an infallible indicator of destitution and squalor, over-crowding and recycled clothing, defective sewage and unwashed hands, suspect produce, and impure water (Herring, 2001). As has been mentioned throughout this paper, such conditions existed upon the transport ships, quarantines and shantytowns that the Irish immigrants were exposed to.

In situations where poor sanitary conditions and widespread poverty are common, for example, in certain areas of Peru and Brazil, it is clear that repressive control measures like quarantine are ineffective at keeping highly transmissible infectious diseases in check (Nations and Monte, 2000). There are still calls for quarantine when cholera occurs, but this is rarely effective because the frequent result is that many individuals hide their illnesses in order to avoid being put into quarantine. Mass immunization programs for cholera are very costly and offer little effective control because the vaccines only work for a few months. The best ways to prevent cholera outbreaks appear to be safe water supplies and adequate methods of excreta disposal (Herring, 2001). Although cholera was at one time believed to have only been endemic in certain areas of the Ganges River basin, it is now endemic in numerous parts of the world, including South America (Herring, 2001). As with the historical outbreaks that occurred in Canada, modern epidemics seem to be located in conditions where there are deficient environmental conditions due to poverty.

## **Conclusion**

The characteristics of the epidemics from 1832 to 1860 give clear examples of conditions that appear encourage the outbreak of these diseases. Poverty, sub-standard sanitary practices, densely built small dwellings, limited health care, and ineffective quarantine measures all contributed to the severity of the outbreaks among certain groups of the Canadian population. Such conditions continue to be extremely relevant in cholera outbreaks. These factors do not work alone, as they often interplay, and consequently affect the way a disease unfolds upon a population. Although every population under stress experiences difficult circumstances for a unique set of reasons, the consequences on human health tend to be very similar. Further study in this area might allow health officials to isolate specific disease instigating factors, and then learn how to prevent them to the greatest degree possible. Furthermore, since socio-economic health determinants play such a significant role in the development of certain common infectious diseases, emphasizing the relevant health determinants would be highly beneficial in the education of medical students. Clear examples like the Irish immigration in to Canada offer useful models that can be applied to

modern society would also be helpful in conveying the importance of socio-economic factors to future physicians.

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# PLAGUE, POLITICS AND PREJUDICE: SOCIAL CONSTRUCTION OF THE PLAGUE IN 20<sup>TH</sup> CENTURY CALIFORNIA

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## ABSTRACT

Resurrected from the annals of history, the plague has gained recent media attention as a potential agent of biological warfare. In history textbooks, its name conjures images of death and destruction, and its potential for devastation has been well documented in accounts of 14<sup>th</sup> century Europe, where it decimated the population. Yet in North America, the plague has had a much more recent impact. Two plague epidemics struck 20<sup>th</sup> century San Francisco, from 1900-1904 and from 1907-1908. In the first San Francisco epidemic, most fatalities were Chinese immigrants. Consequently, residents blamed the disease on the Chinese community, citing their supposed poor hygiene and filthy living conditions, thus demonstrating the political use of disease to vilify an already marginalized community. A poor understanding of the plague's transmission exacerbated this "social construction" of the disease. The second San Francisco epidemic of 1907 differed markedly not only because of greater knowledge of the role rats and rat fleas play in transmitting the plague-causing *Yersinia pestis* bacterium, but also because those affected were primarily white—the plague was no longer solely an "Oriental" disease. Prejudices relinquished, authorities relied on scientifically sound health measures to successfully combat the outbreak. A century later, we know that diseases do not strike indiscriminately—certain populations are affected more frequently. The social construction of disease is sometimes unavoidable; yet as long as we acknowledge this, we can avoid allowing these beliefs to unnecessarily colour our perception of a disease or its victims. We must recognize the potential implications these attitudes may have for health policy and disease management, and act not only according to medically sound practices, but according to accepted moral and ethical standards as well.

## Introduction

The plague, a highly virulent and often fatal disease, has played an inestimable role in world history through its devastating effects on not only population size, but also on trade, politics, economics, and social order (Craddock 2000; Salyers & Whitt 1994). Although the plague still occurs today in isolated cases, in times of outbreak, it can decimate a population—as evidenced by the "Black Death," which claimed 20-30 million lives across Asia and Europe in the 14<sup>th</sup> century.

The plague-causing bacillus *Yersinia pestis* was discovered independently by both the Swiss bacteriologist Alexandre Yersin of the Pasteur Institute and by Japanese bacteriologist Shibasurburo Kitasato during the 1894 Hong Kong epidemic (McClain 1988). The gram-negative bacterium's natural vector is the rodent flea *Xenopsylla cheopis*, whose mammalian hosts can include squirrels, prairie dogs, chipmunks, and, most commonly, rats. *Y. pestis* can be transmitted from rats to humans by flea bite, by direct contact with infected animals or their excrement, or from person to person via respiratory droplets.

Although the disease caused by *Yersinia pestis* is often referred to as “bubonic plague,” the plague's infectious agent can manifest itself in three different forms: bubonic, septicemic, or pneumonic plague. Sudden onset, malaise, fever, chills, headache and myalgia characterize all three forms of plague. Bubonic plague, the most common and usually the initial form, presents clinically with painful swellings, or buboes, in the axillary, inguinal and cervical lymph nodes, and can produce bacteremia when the bacteria enter the circulatory system. Bubonic plague can then progress to septicemic plague, which causes the subcutaneous haemorrhaging which gives its victims' skin a dark, bruised colour (hence the name “Black Death”), as well as depression, disorientation, muscular atrophy and septic shock. In pneumonic plague, the most fatal form, the lungs are infected either by bacteremic transmission or by the inhalation of aerosolized bacilli, causing hemoptysis, pain and shortness of breath. If not treated early enough, pneumonic plague has a mortality rate of almost 100%; today, however, it is easily treated with antibiotics.

During the late 19<sup>th</sup> century and early 20<sup>th</sup> century, although the infectious agent of the plague had been identified, its transmission was not yet completely understood. The germ theory had gained greater acceptance in mainstream medical theory in the late 19<sup>th</sup> century; however, it did not completely supplant the previously-held “miasmatic” or environmental theory of disease (Craddock 2000, 96). The notion that disease is carried by disturbances in the local atmosphere caused by poor sanitation, and thus more likely to strike those living in a filthy environment, played a significant role in the social response to the epidemics of early 20<sup>th</sup> century California (Trauner 1978). Despite advances in medical knowledge in the etiological understanding of diseases, there still exists a temptation to allow other non-medical factors to colour one's perception of certain diseases and those affected.

### **Social Construction of Disease**

The “social construction of disease” can be loosely defined as the process in which non-biological factors, such as race, culture, gender, sexual orientation or socio-economic status influence how we view diseases; scholars commonly credit Charles Rosenberg, and his 1962 book *The Cholera Years*, for pioneering the concept. There is a complex interaction between the medical cause of a disease and the social context in which it occurs, to such an extent that it is often difficult to separate the two, leading to the conflation of a disease with its victims. The tendency to allow members of group to be seen as “equivalent to the disease or its cause” is a common theme in the history of medicine (Duffin 1999, 85), allowing us to even blame victims for the emergence and spread of the disease afflicting them. Especially true for infectious disease, there are countless examples in history of how diseases have both reflected and reinforced commonly held societal values. In 15<sup>th</sup> century Europe, syphilis was

called the “French disease” by the English, the “English disease” and “Spanish disease” by the French, and the “Neapolitan disease” by the Spanish (Duffin 1999, 145). At various times throughout the epidemic, the Black Death in Europe was blamed on foreign travellers, minorities, the mentally ill, witches, and Jews (Duffin 1999). Previously existing social inequities have often been a major influence in the management of epidemic disease.

In early 20<sup>th</sup> century California, it was easy to equate disease with an already marginalized group of society. The Chinese in San Francisco had already been made “medical scapegoats” in the smallpox epidemics of the late 19<sup>th</sup> century (Trauner 1978), setting a precedent for 1900, when the plague made its first appearance in San Francisco (and all North America). The dominant class used plague, and the subsequent public health response, as political tools to advance various anti-immigrant agendas by framing the disease in the context of deeply rooted prejudices.

### **The Chinese in 20<sup>th</sup> Century California**

In the late 19<sup>th</sup> century, San Francisco had the largest Chinese population of any U.S. city, partly due to its function as a major west coast port city, and partly due to its economic growth following the Sierra Nevada gold rush of the 1850s (Trauner 1978, McClain 1988). Chinese immigrants flocked to California for the many available (albeit poorly-paid) labourer jobs (Craddock 2000). Due to the soaring need for workers, the Chinese were not seen as taking jobs away from Americans. However, after 1870, with the beginning of an economic recession and the completion of the Central Pacific railroad, unemployment rates increased, and Americans began to view the Chinese as a threat. The Chinese were willing to work longer hours for less pay than their white counterparts; however, rather than respecting their strong work ethic, Americans feared that the Chinese would “undermine the dignity and wage scale of American workers” (Kraut 1994, 80). Anti-Chinese hostility grew, fuelled by the widely held perception that Chinese immigrants were taking away jobs that rightfully should have gone to the white working class (Craddock 2000).

The increasingly overt feeling of “Sinophobia” in California at the time manifested itself through racist legislation as well as other, subtler forms of discrimination. In 1882, the Chinese Exclusion Act was passed, limiting further emigration. The act prevented the many Chinese workers who were raising money to support their families in China from bringing their families to America to join them (Kraut 1994). This act was subsequently renewed in 1892 and 1902. The overwhelming climate of discrimination made it difficult for the Chinese to integrate into American society. Landlords often refused to rent accommodations to Chinese, which contributed to the clustering of Chinese in certain areas within cities—this was not an unusual settlement pattern for immigrants, and most major cities in America had (and still have) various districts largely populated by certain ethnic groups.

In San Francisco, Chinatown was comprised of 12 square blocks in the heart of downtown, and was extremely densely populated. However, despite the belief of Americans that the Chinese chose to live there for cultural reasons (although this certainly did play some part), this was often out of economic necessity. Located in the middle of the city, the Chinese quarter could not expand, and new immigrants often could not find housing elsewhere. The

population density of Chinatown skyrocketed accordingly, leading to cramped living conditions, with makeshift structures being built wherever there was space. By 1900, 18 000 Chinese and 1800 Japanese were living in Chinatown (Lipson 1972, 304). Huge numbers of people living within a confined area caused living conditions to deteriorate; buildings lacked adequate lighting, ventilation, and sanitation. Chinatown's inhabitants dug tunnels between cellars and travelled in the sewers between buildings, often dumping trash, excrement, and even the dead in these subterranean passageways (Lipson 1972). As Chinatown's population grew, so did its filth, its capacity to breed rodents, and its isolation from the rest of society, none of which did anything to dissuade its Caucasian neighbours from harbouring anti-Chinese hostility and prejudice.

### **Chinatown and Disease**

The marginalization of the Chinese community in San Francisco and its concomitant association with disease was nothing new; in fact, the general public held the Chinese responsible for previous health epidemics of smallpox, leprosy and tuberculosis in the late 1800s (Trauner 1978). The Chinese were already hated and feared as “the Other,” and Chinatown as a “foreign, highly racialized district,” socially and culturally distinct from the rest of the city (Craddock 2000, 63). Once Caucasians associated the Chinese with disease, they were able to justify keeping Chinatown as a “distinct and undesirable part of San Francisco” (Craddock 2000, 69). Disease became a political tool, a mechanism to exert power over what was seen as a deviant population, and Chinatown was “the pre-eminent site of urban sickness, vice, crime, poverty and depravity” (Shah 2001, 1). In his 1870 report to municipal officials, city health officer A.P. O'Brien referred to the Chinese as “moral lepers” who would “breed and engender disease wherever they reside” (cited in McClain 1988, 453). Craddock writes that the social construction of disease involves association at two levels: the individual and the spatial (2000). This is exemplified in the way Caucasians associated disease not only with the Chinese themselves, but also with the geographical area in which they lived. The white inhabitants of San Francisco saw Chinatown as a “breeding ground” of disease; as well, they extended this to individual Chinese themselves:

*For outsiders, the picture was of narrow and labyrinthine streets, with buildings so close together as to preclude the entrance of sunlight. Filth abounded, the stench was unbearable, and crammed in every basement, building, stairwell and street were the huddling and disease-ridden bodies of Chinese.*  
(Craddock 2000, 75)

Paradoxically, because of their fear and hatred of a supposedly diseased and deviant community, throughout the late 1800s, San Francisco city officials were reluctant to fund health care or sanitation services in Chinatown—thereby reinforcing the same stereotypes that immobilized them. Furthermore, municipal officials did not want to admit any Chinese to city health care facilities; the Board of Health even passed a resolution that “essentially closed City and County Hospital to Chinese patients” prior to 1881 (Trauner 1978, 82). This forced the Chinese to provide their own health care services, and their “hospital” consisted of nothing more than a small room with straw mats for patients, staffed by Chinese traditional healers and herbalists. The makeshift hospital was a violation of city health codes, but city



“magnanimously” turned a blind eye since it was not providing health services for the Chinese. Only in times of epidemics, however, when other areas of San Francisco were threatened, did city officials concern themselves with the health and sanitation of Chinatown (Trauner 1978).

### **The 1900-1904 Epidemic**

On March 6, the body of Chick Gin, a 41-year-old Chinese labourer, was found in a small, dank basement room in the Globe Hotel in San Francisco’s Chinatown. Because Chick Gin was Asian and had died unattended, an autopsy was performed by assistant city physician Dr. Frank Wilson (Lipson 1972). Suspicious of the enlarged inguinal lymph nodes on the body, Dr. Wilson alerted the city’s Chief Health Officer A.P. O’Brien. O’Brien, in turn, notified the municipal bacteriologist Dr. Wilfred Kellogg, who, upon examining smears from Chick Gin’s swellings under a microscope, found bacteria resembling *Yersinia pestis*. Suspecting plague, Kellogg contacted the United States Public Health Service Chief Quarantine Officer Dr. Joseph Kinyoun. At his laboratory at the Angel Island quarantine station, Kinyoun inoculated a guinea pig, a rat and a monkey with lymphatic tissue taken from Chick Gin’s body to see if the animals would develop plague. However, before Kinyoun’s lab results were known, Kellogg prematurely announced his suspicions to the city Board of Health. The city Board of Health, headed by Dr. John Williamson, took quick action to quarantine Chinatown. They evacuated all Caucasians in the 12 square block area and cordoned off the district, allowing only Caucasians to leave, and prevented anyone else from entering or exiting the area. Police began inspecting the district for more cases of plague. All measures were imposed over the course of a single day, even before there was any confirmatory evidence that Chick Gin had indeed died of plague.

Expecting praise for their quick action, the San Francisco Board of Health was unprepared for the onslaught of criticism the quarantine of Chinatown provoked in the local media. At the time, San Francisco journalists “knew little about the role of the plague in world history, and... lacked a technical knowledge of the disease” (Kalisch 1972,116). They viewed the plague alarm as a scare tactic, a plot to get more funding for the city Board of Health. The San Francisco public reacted accordingly, decrying the supposed corruption of city health officials; the Board of Health bowed to public pressure and lifted the quarantine of Chinatown less than two days after imposing it. Fearing the economic repercussions of a potentially devastating disease in the city, federal and state government officials, as well as business leaders with vested financial interests, tried to conceal the discovery of the plague; it was only two years after the first case that the state admitted to the existence of plague in California (Kalisch 1972). The complex and insidious interaction between politics and racism in the context of a public health crisis led to one of the most controversial episodes in the history of American public health (Lipson 1972), involving politicians and legal and health experts alike at the municipal, state, and national levels.

### **Susceptibility and Transmission**

Chick Gin’s dingy surroundings at the time of his death is symbolic of the tendency at the time to associate disease with filth, for Chinatown itself was seen as a place of depravity and

a “laboratory of infection” (Trauner 1978, 73). Given the knowledge of plague etiology at the time, it is interesting to note the highly unusual steps taken by the San Francisco health authorities to prevent plague transmission. It was unprecedented to quarantine an entire district, especially given that only one case was suspected; usually, only the buildings where disease victims or any known immediate contacts resided would be quarantined (Shah 2001). As well, the quarantine applied only to the Chinese within Chinatown. Any Caucasians found within the quarantine boundary were permitted to leave. Shah writes that “municipal and federal health authorities believed they could divide the contaminated from the uncontaminated along racial lines” (2001, 121) since they believed that only the Chinese were susceptible to the plague. This in itself is suspect, since there was evidence that Caucasians were not immune to plague—Caucasian scientists in the late 1800s had died from the plague while studying it in Asia (Craddock 2000).

With the advent of germ theory in the late 1800s, patterns of disease susceptibility shifted from the “dirt and depravity” of environmental theories to more “scientific” concepts of diet, heredity and ethnic background. However, Craddock suggests that what actually changed was the rhetoric used, rather than any change in mindset:

*Previous concepts popular in environmental explanations of disease were recouched into scientific language focusing on the body’s internally prescribed vulnerability to germ access. In the case of plague, susceptibility was dictated by Asian origin and by a vegetarian, and more specifically, a rice-based diet. (2000, 130)*

In an 1897 report to the federal government, Public Health Service Surgeon General Walter Wyman reported that “Asians were particularly prone to plague because they were rice eaters, and therefore deficient in animal proteins considered critical for building bodily resistance” (cited in Risse 1992, 264). Wyman was confident that the medical community had completely elucidated the plague’s mode of transmission. They believed that the plague bacillus was transmitted in the following ways: through the air into the lungs and stomach, ingested through contaminated food, inhaled in infected dust, through contact with infected soil, and contact with open sores of plague victims (Craddock 2000). In the same 1897 report, Wyman wrote that “[the plague’s] cause, method of propagation and the means to prevent its spread are matters of scientific certainty” (cited in McClain 1988, 458). However, his confidence may have been premature; McClain describes the medical community at the time as having “cocksure optimism bordering on hubris that could distort their vision and blind them to some obvious realities” (1988, 458). Despite Wyman’s certainty, environmental theories of disease still held considerable influence among the medical and lay communities. Although they may have been correct in assuming that plague transmission is facilitated by filth and lack of sanitation (albeit indirectly), they still knew very little of the significant role played by rats, and by rat fleas, in the spread of the disease.

### **Difficulties in Diagnosis**

Throughout the 1900-04 epidemic, plague diagnoses were made by city health officials on the basis of clinical symptoms and microscopic evidence (only the very first case was

confirmed by a laboratory test). However, such diagnoses were often controversial for a number of reasons. First, there were many other diseases that the plague's symptoms resembled clinically, such as syphilis, typhus, and typhoid fever (Risse 1992). Second, the actual morphological characteristics of the *Y. pestis* bacilli were disputed, which made it even more difficult since most health practitioners at the time had not been formally trained in microscopy (Risse 1992). Third, cases of plague may have been missed among the Caucasian population due to the bias (conscious or otherwise) of the examining physician; many Caucasian patients with similar symptoms were diagnosed with acute syphilis because physicians may have thought they were not susceptible to plague. In a letter to Surgeon General Wyman, Assistant Surgeon Rupert Blue wrote of his wishes to "keep the plague limited to an 'undesirable community,'" stating that he deliberately looked for Chinese links to cases of plague in Caucasians, and "consciously ignored other possible sources of infection" (cited in Craddock 2000, 146). Very few identified plague cases in the first San Francisco epidemic were non-Chinese; whether we can ascribe this to deliberate racism in all cases is debatable.

### **Suspect Public Health Measures**

Many public health measures taken to control plague in San Francisco reflected the cultural framing of plague susceptibility and transmission. Only Caucasians in Chinatown were allowed to leave the area during the district-wide quarantine of May 7-9, 1900, and subsequent public health edicts proved to be equally discriminatory.

On May 15, 1900, Surgeon General Wyman recommended mandatory vaccination of all Chinese in Chinatown with the Haffkine plague vaccine, which was still very much experimental. Highly toxic, it caused numerous painful side effects, and did not always prevent plague infection. However, ordering mandatory vaccination of all of Chinatown's residents seemed to contradict previous statements by Wyman himself that the vaccine was strictly a preventive drug, and therefore shouldn't be given to anyone who may already have been exposed to the disease because it might actually cause infection (McClain 1988). Predictably, the Chinese community reacted with outrage, and most refused to submit to the vaccine. That same day, Wyman ordered the Southern Pacific Railroad to stop selling tickets to Chinese without a certificate of vaccination, and posted inspectors at all state border crossings. A few days later, he further restricted Chinese freedom of movement by petitioning the President of the United States, James McKinley, to invoke the Quarantine Law of 1890. This would allow the Public Health Service to prohibit any "Asiatics or other races particularly liable to the disease" from leaving San Francisco, and was the first time in the outbreak that the Japanese had also been singled out as potential carriers of plague (Shah 2001, 133).

Represented by community leaders in the Chinese Consolidated Benevolent Association, the Chinese took legal action to protect themselves from these coercive and racially influenced measures. They challenged Wyman's edicts in the federal Circuit Court for the Northern District of California. On May 28, 1900, Judge Morrow ruled that the Public Health Service measures of travel restrictions and forced vaccinations were illegal and racist, especially

given that the San Francisco Board of Supervisors had not yet officially declared plague to exist.

The city reacted immediately, declaring that plague did exist, and imposed a second quarantine of Chinatown on May 31<sup>st</sup> 1900. Like the first, the second quarantine was not based on the locations of known plague cases, but instead encompassed the blocks bound by Kearny, Broadway, Stockton and California Streets. Yet when city officials realized there were Caucasians living and working within these boundaries, the boundary lines were redrawn, deliberately excluding Caucasians in “a perfectly sawtoothed pattern of [quarantine] enforcement - every Caucasian address free of restrictions, every Chinese address subjected to them” (McClain 1988, 496). Wooden fences and barbed wire were put up around the area, including areas of Chinatown where no plague had been found. The barriers served to bar exit to all Chinese, thus increasing risk of plague transmission to healthy Chinese; rightly suspicious, the Chinese viewed the quarantine as “strategy... intended to kill off those expendable [Chinese] people caught within the boundaries, rather than provide a means to suppress the plague irrespective of the race of the victims” (Shah 2001, 156). That same day, city health officials began arrangements to detain all Chinese at quarantine stations on Mission Rock and Angel Island while Chinatown was thoroughly sanitized.

The Chinese were again forced to challenge the city health officials in court. On June 15, Judge Morrow ordered the quarantine to be lifted because it was “racially discriminatory, and too drastic to meet the conditions for suppressing a contagious disease” (McClain 1988, 496). He also ruled against the city’s detention plan, which “could only be seen as a first step of an operation aimed at mass removal of the Chinese from San Francisco... and it was so interpreted by the Chinese” (McClain 1988, 495).

Despite the Chinese community’s successful challenges in federal court to the city’s health measures in 1900, they did not succeed in breaking down the underlying association of ethnicity and disease (Craddock 2000), and only managed to lessen the severity of the city’s efforts to purge San Francisco of the plague and those they saw as responsible for its spread. Having failed to remove the Chinese from the district, in April 1901 city officials launched a thorough sanitation campaign around its inhabitants, removing garbage, disinfecting Chinatown’s sewers with carbolic acid, saturating the ground with chlorinated lime and mercuric chloride, and fumigating its buildings with sulphur. Only three years later in 1904, with increased knowledge of plague’s true etiology, did the city enact its first rat-proofing measures, removing wooden-planked sidewalks and destroying cellars and underground tunnels. The last case of plague was reported on Feb. 19, 1904; over the four years, the plague had struck 121 people, killing 118 of them, 107 of whom were Chinese (Todd 1909, 9).

### **The 1907-1908 Epidemic**

On April 18, 1906, San Francisco was struck with an earthquake of record magnitude and a subsequent fire, wreaking destruction on much of the city, with extreme consequences for public health. Sewer and water pipes were broken, and many people were left without shelter. Open areas such as parks were temporarily converted into “overcrowded, poorly

sanitized, unhealthy refugee camps” (Craddock 2000, 149), resulting in an increase in typhoid fever and diarrheic diseases. The chaos of rubble-strewn, post-earthquake San Francisco proved extremely hospitable to rats, helping set the stage for another plague outbreak.

On August 12, 1907, a Russian sailor died of plague, and three other cases were shortly identified, signifying the beginning of what would be a short, but intense outbreak. The 1907-1908 epidemic was, in fact, more spatially dispersed than the first, and infected 160 people over the course of 18 months (Craddock 2000, 148). Of these 160 people, most of whom were Caucasian, 78 died. Yet despite the increase in infection rate and the greater efforts required to control the second outbreak, the plague’s mortality rate dropped from over 95% in 1900 to less than 50% in 1908. This change in mortality was attributed “not to race or condition, but to earlier discovery and prompt treatment” (Todd 1909, 9).

Significant differences between the second epidemic and the first were that most of the 1907-08 victims were Caucasian, and the geographic focus of infection had changed. Between 1907-08, plague was found in virtually every San Francisco district. Interestingly, Chinatown was one of the few districts not affected, likely due to the sanitary and ratproofing measures taken during first epidemic, which included rebuilding structural foundations with cement instead of wood. Another important difference was that no group denied that plague was present—“improved worldwide surveillance of the disease this time precluded any possibility of denying its existence in San Francisco, and in fact no attempts were made to do so” (Craddock 2000, 151)

The greatest change from 1900 was that the role of fleas in transmitting plague bacilli to rats, and subsequently to humans, was finally fully understood, due in large part to the publication of the findings of the Indian Plague Commission in September 1906 and increasing knowledge of bacteriology among health practitioners, politicians, and even the public itself (Risse 1992, Craddock 2000). Armed with this new information, the city tailored its approach to controlling the spread of plague accordingly (Todd 1909). Under the guidance of Assistant Surgeon Rupert Blue, the city’s public health measures “reflected the increasing representation of science in the application of antiplague tactics,” using a combination of intense public outreach and education, scientific inspection and surveillance, active community participation in rat monitoring, trapping, and killing, and systematic sanitation efforts using insecticides (Craddock 2000, 157).

Not once during the outbreak did anyone recommend district-wide quarantine or mass inoculation. The newly formed Citizens’ Health Committee loudly proclaimed that “bubonic plague is not a filth disease—it is a rat disease” (Todd 1909, 12), and rat catching was hailed as the “most effective means to eradicate bubonic plague” (Shah 2001, 155). Having seen the effects of the first outbreak, and fearful of further consequences of plague on commerce and tourism, San Francisco’s inhabitants were quick to cooperate, faithfully rat-proofing their buildings, disposing of garbage, keeping their houses free from refuse, trapping and killing rats—all measures aimed at reducing the rat population and its flea-borne microscopic threat (Risse 1992). After a year and a half of their crusade against rats, with an estimated one million rats killed, the last plague-infested rat was reported on October 23, 1908 (Risse 1992, 283).

## Conclusion

The 1900-1904 and 1907-1908 epidemics took place “within radically different political and scientific contexts,” and were managed in very different ways (Risse 1992, 283). The first outbreak occurred in a climate of pervasive racial discrimination—the precise mode of plague transmission was unknown, and the Chinese were a convenient scapegoat. The fact that most of the fatalities were Chinese could have been a result of the periodic confinement of all Chinese, healthy or ill, within Chinatown, as well as selective plague diagnoses by biased health officers. Yet the strategies used in an attempt to contain the disease may have ultimately led to its dispersal to other states, for thousands of Chinese fled California during 1900-1904 to escape the Public Health Service’s oppressive anti-plague measures (Risse 1992).

During the second epidemic, however, plague was no longer associated with a particular race or geographic area; rather than targeting a specific ethnic community, the city could focus anti-plague efforts on rats and their fleas. Yet echoes of past stereotypes lingered, despite massive public education campaigns. Although plague “no longer was a typically Oriental disease, nor wholly a filth disease, nor the peculiar affliction of vegetarians... it was curious how hard these ideas were to dispel, even in the face of the evidence furnished by white men’s funerals” (Todd 1909, 38).

The 1907-08 plague outbreak was the last major episode of epidemic disease to strike San Francisco, until, some would argue, the rise of HIV/AIDS in the homosexual community in the late 1980s (Craddock 2000). Public reaction to the HIV/AIDS “epidemic” has mirrored the initial social response to the plague in North America. An example is the Centre for Disease Control’s “4 Hs of HIV infection” (cited in Craddock 2000, 160): homosexuals, Haitians, heroin users, and hemophiliacs. Two decades after the initial appearance of HIV/AIDS, we know that the disease is not only limited to those four communities. Yet it was extremely easy to frame our understanding of the disease according to our pre-existing attitudes (and perhaps prejudices) towards these marginalized groups; at the time, many people erroneously believed that if they didn’t fall into one of those groups, they were immune to infection.

The plague, HIV/AIDS and many other examples of infectious disease throughout the course of medical history have shown us how easy it is to allow us to socially construct a disease and its victims due to other, perhaps subtle, non-medical influences. Consequently, there is a constant danger that even with the best of intentions, public health measures can potentially strengthen social inequity, rather than correct it. Yet as long as we recognize our underlying tendency to allow other factors to influence our understanding of disease, and are aware of the potential for bias in disease diagnosis, treatment and prevention, we can hopefully avoid, or at least minimize, the dangerous implications these attitudes may hold for public health policy and future disease management.

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# DEADLY PRAYER

By

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## ABSTRACT

**The Native people of North America have the highest tobacco use (both smoked and smokeless) of all people in North America. How did this come to be? Does the high prevalence of tobacco use among Natives stem from the fact that tobacco is considered a sacred herb, given to the Natives by the Great Spirit, complete with an extensive set of ritual uses? Perhaps it has more to do with the influences of the Europeans after America was discovered in 1492. Tobacco's origins, and ritual uses must be considered when trying to reduce the harmful effects of tobacco among the Native people of North America.**

Tobacco is the cause of many illnesses, and much in the way of health care spending. Native Americans have the highest use of tobacco. Native people view tobacco as one of four sacred herbs. In the precontact era, tobacco was used for political, medicinal, ceremonial, spiritual and social purposes. Were precontact uses relevant to the high prevalence of tobacco use today? Precontact uses played a role in the problems with tobacco use today, but they are by no means the sole reason for the problem.

Tobacco is believed to be one of the first plants domesticated in the New World (Winter, 2000). It originated from South America, and made its way to North America by intertribal trade. Today tobacco grows wild over most of North America. The tobacco plant is from the family of plants that includes tomatoes, potatoes, chilli peppers, petunias and belladonna. There are over 95 species of tobacco (Winter, 2000). The two most important in Native use are *Nicotiana rustica* and *Nicotiana tabacum* (Winter, 2000). *N. rustica* is the milder variety that was used by Natives in the precontact era, and is still used today in ceremonies if it is available (Pego, Hill, Solomon, Chisholm, and Ivey, 1995). *N. tabacum* is the more potent variety that is now used commercially in the tobacco industry.

Today, more than 55% of Native Americans in Canada regularly use tobacco, compared to 45% of Native Americans in the United States (Winter, 2000). These rates are more than 10% higher than the population average. Tobacco use tends to be highest in reserve populations where traditional values and sentiments are most prevalent (Pego et al, 1995). A report by the Surgeon General compared types of tobacco use, race and sex from 1987-1991 (U.S. Department of Health and Human Services, 1998). This study found that for any tobacco product (cigarettes, pipes, cigars, chewing tobacco and snuff) 40.2% of Natives used tobacco, compared to 35.2% of African Americans, 23.4% of Hispanics, 32.2% of Whites, and 31.5% of the total population.



Natives believe that tobacco is one of the four sacred herbs given to them by the Great Spirit (sage, sweetgrass, and cedar are the others) (Null, 1998). Each tribe has its own myth as to how Great Spirit gave tobacco to the people. These myths differ between the tribes, yet many are quite similar. For example the Huron myth tells the story of an ancient time when the land was bare and the people were starving (Borio, 1997). Great Spirit saw the suffering of the people and sent a woman to save humanity. She traveled around the world, and wherever her right hand touched, potatoes grew, wherever her left hand touched, corn grew. When the Earth was rich and fertile she laid down, when she arose tobacco grew in the place she had rested. Thus the people knew that tobacco had been a gift to them from Great Spirit.

Tobacco was used traditionally for purification, as an offering, for healing, to promote peace, and as an aid to prayer. For ceremonies, tobacco was blended with bark, leaves and herbs, to form a milder mixture known as kinnikinnik (Pego, 1995). Kinnikinnik is used to purify or cleanse oneself through the act of smudging (Null, 1998). The mixture of herbs is set on fire, then the flames are put out, leaving the herbs to smoulder and give off smoke. This smoke is blown or fanned over one's body through hand motions or with the aid of feathers or the wind. It is believed that the smoke takes away negativity; thus it is often done before ceremonies to cleanse an individual before the ceremony begins. It is also used to cleanse whatever objects are to be used in the ceremony.

Tobacco also was used and continues to be used as an offering. There are several ways that tobacco is used as an offering. Every morning the holy man of the tribe takes his pipe and faces the East (the direction of the new day) and offers himself to Great Spirit (Bear Heart and Larkin, 1996). He offers himself so that he has the courage and strength to face whatever is presented over the course of the day, and continues to walk in the sacred manner. Another type of offering is of someone seeking the service of a holy man of the tribe. When people need guidance or a ceremony to take place, they take tobacco and offer it to the holy man (Bear Heart and Larkin, 1996). By this act, the holy man is obligated to perform the services requested, because this is part of the life and responsibilities of a holy man. The tobacco is not a payment for services, but an integral part of the ceremony itself. Tobacco is also used as an offering when something has been provided. If people have prayed to Great Spirit, making a request for something, they give an offering of tobacco to say thank you when they receive it (Bear Heart and Larkin, 1996). Also, when a natural product of the Earth is used for one's own purposes (such as a tree being used in the frame of the lodge in a sweat lodge ceremony, or when an animal is killed for food), tobacco is again offered to thank the object for the sacrifice it has made, and to thank the Earth and Great Spirit for providing that object (Goodstriker, 1995-2000).

Tobacco was also used extensively for medicinal purposes. It was used as an analgesic, to treat earaches, toothaches, headaches, rheumatism, and childbirth pains (Pego et al, 1995). It was believed to have an antiseptic quality and thus was used to treat the bites of insects or snakes, and any open wounds. It was also used as an antipsychotic. If tobacco was scattered while reciting prayer, it was believed that this would exorcise spirits or ward off the evil influences that were causing disease. The smoke of tobacco was blown into an individual's ear to kill off the "woodland insect" that caused insanity by drying up the brain. It was also used to treat asthma, chills, fevers, and intestinal disorders. It was claimed that it was never

the cause of any sickness. The Europeans also believed it prevented cancer because of the low incidence of cancer among Native peoples when contact was first made.

Tobacco was also an important aspect in the promotion of peace. When signing treaties, the Natives brought along their peace pipe, for all involved to smoke. The smoking of the pipe was more important to them than the signing of the treaty, because the Natives believe that Great Spirit witnesses the smoking of the pipe. Thus when both sides smoked the pipe, it meant that the deal would not be broken because it was witnessed by Great Spirit and you could not go against Great Spirit by breaking your word.

One of the most important uses of tobacco is as an aid to prayer. Natives believe that smoke is the life force (breath) made visible (Meadows, 1990). When you smoke, your breath becomes visible and it allows you to become more aware of its existence. Your breath carries the very essence of your being; it holds your true thoughts, beliefs, intents, wishes, and desires. As your breath rises, it carries all your thoughts and intents to Great Spirit, allowing Great Spirit to witness your true self. Thus when you pray, and you smoke tobacco, you can witness your prayers as they travel to Great Spirit. This acts as an aid to the prayer, because it helps with focusing on what it is that you really want to convey.

In ceremony, many of these various uses for tobacco are brought together. An example of one such ceremony is the vision quest. There are several reasons that an individual would go on a vision quest: to ask Great Spirit to make them brave for a great ordeal, to ask a favor of Great Spirit, to give thanks to Great Spirit for gifts received, or to help one to better understand a vision that they had (Epes Brown, 1953). The ceremony begins when the vision seeker (lamerter) approaches a holy man. The lamerter offers a pipe to the holy man, who smokes it and asks him what he wants. The lamerter is sent off with a list of instructions of things that need to be prepared before the ceremony can begin. Once everything is prepared, the lamerter purifies himself in a sweat lodge. In the sweat lodge, the lamerter smokes the pipe, and tells the holy man (and Great Spirit) why it is that he wants to have a vision, and for how long he will go out to seek it. A sacred pipe with tallow over top is prepared, for the lamerter to take with him. The lamerter then goes off to an isolated place. He holds his pipe with him at all times, and walks in a cross shaped pattern to each of the four directions using his pipe (not smoking it) to pray, and to offer himself to Great Spirit. He has intermittent rests in the center of his cross shape pattern, but his time there is spent praying. Once the specified amount of time has passed, he comes down from his isolated place. He participates in another sweat lodge. Once it is complete, he takes the tallow off his pipe, and as he smokes it he tells of what happened and what he saw as he prayed. The smoking of the pipe is very important here, because all involved know that the lamerter will not lie as he smokes the pipe, because he knows that Great Spirit is witnessing his account. In this ceremony we see that tobacco is used as an offering, as an aid to prayer, as purification (before a sweat lodge begins, a participant will cleanse themselves with smudge), and also medicinally (it is used to help the lamerter deal with some problem or stress that he is dealing with).

The arrival of the Europeans was to be the beginning of a new use for tobacco. When they first arrived the Natives offered their tobacco as gifts to the Europeans (Pego, 1995). In 1518, the seeds of tobacco plants were taken back to Spain, but they took the more potent

*Nicotiana tabacum* (Winter, 2000). Tobacco eventually became popular and was grown all over Europe. When the Europeans would come back to North America, they would bring this more potent variety of tobacco with them to trade with the Natives. The Native people eventually became addicted to this form of tobacco for recreational use; it was not used for ceremonial purposes unless the milder *Nicotiana rustica* was unavailable.

In the end, the only influence that traditional uses of tobacco among Native people have had on current use, was through demonstrating the use of tobacco to Europeans who eventually came to use it to exploit the Native peoples.

As for traditional uses of tobacco today, people are taught not to inhale the smoke when they are using it for prayer. Native people believe that when it comes to doing anything, moderation is key; this is true also when it comes to smoking. They believe that anything can be overdone. It is clear that Native people follow this belief because even though there are a higher proportion of Native people smoking, they smoke substantially less per day than the average smoker (U.S. Department of Health and Human Services, 1998). Tradition has taught them the value of moderation, just as it permitted the beginning of the problems with tobacco seen today.

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# **GLOBALIZATION AND TOBACCO: IN THE WORDS OF THE INDUSTRY - AN EXPLORATION OF 60 YEARS OF INTERNAL INDUSTRY DOCUMENTS**

By

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## **ABSTRACT**

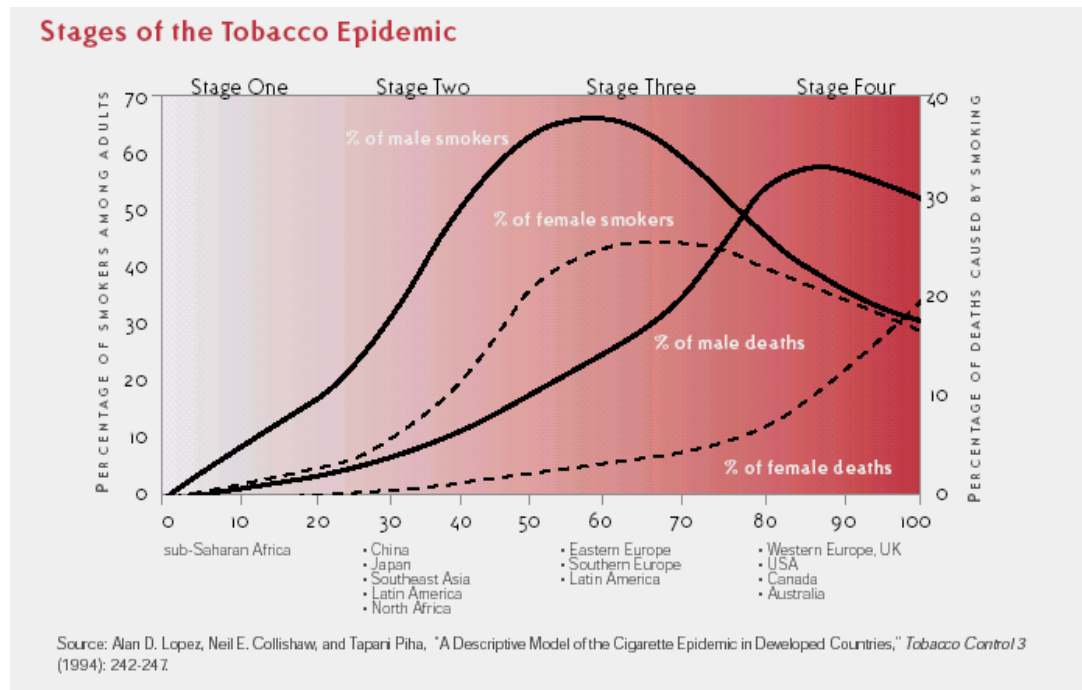
**In the 20<sup>th</sup> century, the global use of tobacco has increased dramatically. Medical professionals in high-income countries (HICs) are well aware of disabling smoking-related health consequences; these are rapidly being replicated in low and middle-income countries (LMICs) as transnational tobacco companies (TTCs) aggressively enter new markets. The global dimensions of tobacco are numerous. They include the widespread advertising campaigns by TTCs, the economic fluidity of TTC investments, the collaborative efforts of tobacco control activists, the high accessibility of tobacco, and the sharing of effective policy initiatives by governments. Public awareness, strong legislation, and active participation by the medical and pharmaceutical communities have resulted in declining tobacco-related illnesses in HICs. In spite of this actions, the World Health Organisation estimates that tobacco kills 3 million people each year, with 1 million of these in LMICs. The current pattern indicates a steady decrease in use in HICs; however, there offset by a rapid increase in LMICs. It is estimated that if this pattern continues without effective interventions, 7 of the 10 million people who die in 2030 of tobacco-related illnesses will be from LMICs. Analysis of seventy years of internal industry documents made publicly available after a 1994 U.S. court case have provided valuable insight into the knowledge and strategies of TTCs and have aided in the formation of national and global policies. This paper explores the broader implications of the TTC British American Tobacco and its activities in India as revealed by the documents located in Guildford, United Kingdom. Just as research into genetics or infectious organisms aids in determining medical treatment, understanding the globalizing forces behind the spread of tobacco is essential to the practice of medicine.**

The complexity of the tobacco control issue is reflected in its multiple links to the globalisation process. Politically, networks of international and nongovernmental organisations are being created through the multiple means of communication available today. Economically, tobacco industry profits are not tied to specific countries or banks, and movement of tobacco goods between nations is being facilitated by multilateral trade agreements and smuggling. Socioculturally, the concept of the “global smoker” can be marketed through a transworld space. These are only some of the factors that affect public

health and that must be considered when developing comprehensive tobacco control measures.

The deadly irony of tobacco-related illness is that “tobacco products are the only products legally available on the market that are harmful when used exactly as the manufacturer intends. The industry kills its best customers.” The WHO estimates that tobacco kills 3 million people each year, with 1 million of these in developing countries. It is estimated that if the current pattern of use continues without effective interventions, 7 of the 10 million people who will die in 2030 of tobacco-related illnesses will be from low and middle-income countries (LMICs). (See Figure 1)

Figure 1:



Despite the severity of this public health crisis, many people do not realise that cigarette smoking is the leading cause of premature death in high-income countries and one of the largest causes of preventable disease worldwide. In LMICs, smoking-related illness is the largest cause of preventable deaths after malnutrition and infectious diseases.

One of the main difficulties in eliminating tobacco use is the fact that cigarettes were legalised long before their detrimental health effects were widely known. The addictive qualities of tobacco have led to a situation where cigarette use has become entrenched in society and transnational tobacco companies (TTCs) are extremely powerful. Although global tobacco control is a daunting area with multiple facets, governments, non-governmental organisations (NGOs), and individuals are employing many creative strategies to minimise and prevent tobacco use.

This paper will focus on some of the information that has been gleaned from a collection of over sixty years of internal industry documents. Research was conducted by the author in

Guildford, U.K. at the British American Tobacco (BAT) document depository in order to explore BAT's strategies in India. This was part of a larger fourteen-country study initiated by the Centre on Globalisation at the London School of Hygiene and Tropical Medicine. Examples from India and Canada will be cited; in addition, global linkages will be made. This will provide a glimpse into the thought processes and strategies of TTC executives. This knowledge can and is being used to formulate medical and public health initiatives, influence individual actions, and increase corporate accountability.

### **The Significance of the Documents**

In the Minnesota Tobacco Trial of 1995, the State of Minnesota, and Blue Cross and Blue Shield of Minnesota came to a settlement with nine tobacco industry organisations. The agreement required the major US tobacco companies and British American Tobacco to make their internal documents publicly accessible. Over 35 million pages of industry documents from US companies such as RJ Reynolds and Philip Morris are stored in Minneapolis, while BAT's depository is located in Guildford, UK. The Guildford depository holds approximately 40 000 files with 8 million pages dating from the 1930s to 1996.

The importance of the documents for gaining insight into industry strategies cannot be exaggerated. As stated by Derek Yach, the project manager of the World Health Organisation (WHO) Tobacco-Free Initiative, accessing the material in these documents is equivalent to a malaria researcher possessing the knowledge of the mosquito. Well-known academic and tobacco activist Stanton Glantz likens their content to that of the human genome project:

*“There is, however, another map that holds as much promise for curbing disease: depositories containing millions of pages of previously secret tobacco industry documents. Unlike bacteria, fungi, and viruses that spread disease, however, the tobacco industry employs sophisticated lawyers and public relations experts – and even scientists – to distort the scientific and political process. These documents give us our first clear understanding of how the tobacco contagion works.”*

Research based on the Minnesota documents has revealed evidence of the industry knowledge of nicotine's addictive qualities, something it knew long before the broader scientific community and that it continues to publicly deny. In reality, it has been found that it utilises cigarette design and chemical manipulation to facilitate this addiction. It has also been shown that the tobacco industry has infiltrated certain WHO projects in order to undermine tobacco control measures and that it has collaborated with the confectionary industry to reach young children. In addition, it is now clear that the industry advertises in order to recruit new smokers and increase consumption as well as brand share, contradicting another public statement that its sole advertising goal is to convert smokers from other brands. There are accounts of conspiracies between TTCs in order to protect industry interests by creating controversy over smoking and disease and employing strategies to reassure smokers. TTCs also spend millions of dollars in order to manipulate and discredit scientific research it considers detrimental to the industry; a notable case is Philip Morris' \$6

million strategy designed to undermine the International Agency for Research on Cancer's significant findings regarding the dangers of second-hand smoke.

These and other statements may not necessarily be new knowledge, especially to those who have been previously investigating industry activity. The power of these discoveries lies in the fact that they are "based on the industry's own words," making them "compelling to policymakers, the public, and...the courts." They constitute a wealth of information from which to formulate far-reaching and comprehensive tobacco control measures.

### **Case Study: Focus on India**

As India recently reached the official mark of a population of 1 billion, with many more people likely unaccounted for, TTCs are extremely aware of the enormous untapped potential for cigarette smoking that exists. This sentiment is captured in a gleeful 1994 World Tobacco article:

*"...while Europe's market arteries are becoming clogged with old age, India's are young and freeflowing. It is something hard for a visitor to India to appreciate this point – that this huge and growing population is an asset, but such are the economics of the market-place. A young population buys consumer products such as cigarettes much more keenly than does an old one, because, as Mr Chugh [ITC Chairman] says, such products have to do with living life to the full."*

In addition to young people, the rural population is another burgeoning market. In a 1994 BAT business plan, predatorily entitled *Project Barracuda*, it is observed that "rural India (73% of total Indians) getting urbanised in terms of attitudes, product usage and brand preferences. The size and growth rates...in rural markets represent vast potential."

Similar to many other LMICs, India has a large population and currently has fairly lax tobacco controls, but is moving slowly towards stronger policies. The majority of the population lack knowledge regarding tobacco's ill effects and India has scant medical support to cope with the health consequences of tobacco-related illnesses. These factors are exploited by BAT as it works to establish its global niche.

### **Circumventing Tobacco Control Measures**

#### **a) Taxes and Smuggling**

Various financial measures have been shown to decrease rates of smoking in a country, and higher taxation has been deemed to be one of the most effective tobacco prevention and control strategies. When taxes on cigarettes were increased in Canada in the early 1980s there was a dramatic reduction in per capita consumption. In general, economic research has shown that with every ten percent increase in price, smoking decreases approximately three to five percent for adults and seven percent for youths. Philip Morris admitted the effect of tax increases with the statement that "In the opinion of PM Inc. and PMI, increases in excise

and similar taxes have had an adverse impact on sales of cigarettes.” Given this trend it seems inevitable that TTCs would seek ways to reduce, eliminate, or prevent the institution of prohibitive financial measures. This is especially relevant in emerging markets with weak tobacco control policies where TTCs are working to entrench tobacco use before stronger legislation is passed.

Historically India has had numerous protectionist policies such as an excise tax, restrictions on foreign ownership, and restrictions on foreign importations. For TTCs, these are all impediments to the expansion of their global market, especially in key development areas. However, despite the barriers, there is an abundance of foreign-made cigarettes on the Indian market, of which BAT’s market share is approximately sixty to seventy percent. TTC claims that the foreign brands are available via expected duty free store sales, travellers, and localised smuggling operations are doubtful given the massive volume of brand availability. Much more likely is the proposition that TTCs are primarily responsible for the presence of their brands in markets that are technically closed. One technique that is used to elude government taxes is the promotion of duty free “leakage”. Mentioned frequently in internal documents, it involves using duty free sellers such as hotels as “cover” (with the agreement of the seller) for large amounts of cigarette importation, and then allowing the cigarettes to “leak” out into the general market.

Another major focus is smuggling. In a telling internal document-based publication entitled “Illegal Pathways to Illegal Profits,” the researchers reveal a massive and complex system of smuggling orchestrated by BAT, Philip Morris, and RJ Reynolds. The economic incentives to smuggle include entry into otherwise closed markets, selling of cigarettes at lower prices than legal imports, gaining a competitive advantage, and increasing overall sales. By integrating smuggling into their regular business activities, TTCs buttress their profits as well as ingeniously create a political lever with which to persuade governments to lower taxes. The “Illegal Pathways” document focuses on the four representative countries of Cameroon, Colombia, Bangladesh, and Spain; however, it emphasises the global nature of the 400 billion cigarettes smuggled per year. Further analysis of the Guildford documents has indicated that India is yet another country to add to the growing list.

Far from trying to curb smuggling, as it publicly claims to do, it seems that BAT’s acknowledged stance within the company is that “as long as a transit business is allowed to exist, it is BATUKE’s job to supply it on a continuous fresh stock basis. Far better that the brands supplied be BAT rather than competitive [sic].” There is strong evidence suggesting that not only is BAT aware of the high levels of smuggling occurring both in India as well as globally, but that BAT is in fact integral to the coordination and monitoring of the entire process.

### ***b) Advertising Bans***

Traditional forms of advertising such as billboards, magazine ads and television commercials have been restricted by legislation in many countries. Although these are important steps, it has been shown that unless comprehensive bans on advertising and promotion are enforced, TTC’s are simply able to transfer their marketing dollars to other avenues. This has included



actions such as increasing advertising at the point-of-purchase and augmenting the presence and actor endorsement of cigarettes in films. In relation to LMICs it has been said that aggressive marketing is the most significant factor contributing to the increasing tobacco use.

TTCs are becoming increasingly dependent on sponsorship of sports, cultural, and arts events as a means of advertising. Although TTCs portray their sponsorship activities in a philanthropic light, there are many other factors that motivate their actions. According to a recent WHO article these include the creation of prestige and credibility, blunting of industry criticism, social legitimisation of smoking, procurement of gratitude from recipients, recruitment of allies, and establishment of a marketing platform. These many benefits prompted TTCs to spend about \$139 million dollars on sports and entertainment sponsorships in 1995. Numerous events such as Formula One racing, tennis tournaments, jazz festivals, and ballet performances have become synonymous with various cigarette brands.

The value of sponsorships is articulated in a 1991 BAT draft proposal headed “555 SPONSORSHIP ASIA: THE WAY FORWARD” which states that “with the ever increasing anti-tobacco legislation being brought to bear within our target territories there is an urgent need to reassess our sponsorship activity in the area, in order to have access to the traditional mediums that are now denied to us.” In India, the appeal of sponsorship is increased by the fact that television advertising bans can be further subverted by accessing audiences via satellite television channels such as Star T.V., Sun T.V., and Z T.V.

### *c) Cigarette Constituents*

Many of the ingredients present in cigarettes are of great concern for medical and public health advocates. Some of the more dangerous substances include ammonia, acetaldehyde, polonium-216, carbon monoxide, acetone, and cadmium which may be radioactive, toxic, or carcinogenic. In addition, the burning of the cigarette may initiate chemical changes that augment the detrimental effects of the constituents. Industry documents have revealed TTC efforts to manipulate cigarette content in order to increase nicotine absorption and enhance addictiveness. In the words of BAT in 1980, “BAT should learn to look at itself as a drug company rather than as a tobacco company.”

In India, BAT is striving to convert the 80% of tobacco users who use traditional forms of tobacco to cigarettes. Numerous communications indicate the desire to “develop a very close smoke profile of blends like bidis [non-cigarette tobacco product] to enhance our market share.” This drive to model cigarettes on bidis continues despite the fact that bidis have been shown to have a higher nicotine concentration than most conventional cigarettes.

#### ***d) Packages and Labelling***

Canada has been aggressive in its package labeling policies with the recent introduction of a series of mandatory pictorial health warnings covering a significant amount of the package.



For decades TTCs have objected to health warnings with the following weak argument: “We strongly oppose warning labels on cigarette packs for several reasons: first and foremost, warning labels may improperly imply that it has been scientifically established that smoking causes disease.” (R.J. Reynold, 1981) The World Health Organisation recommends that warnings should cover at least 25% of the package, maximize informed consent, be straightforward, and should apply to all tobacco products. Unfortunately, more than 40 LMICs do not require warning labels on their cigarettes, thus further minimizing consumer knowledge of tobacco effects.

#### **Implications for Health Policy**

The information from this paper serves several purposes. Firstly, it generally reinforces the evidence that has already been found regarding other countries. Acknowledging that these activities are widespread provides a strong basis for the creation of specific national and global tobacco control policies and the incorporation of tobacco-related public health measures into existing policies.

For example, the World Health Organisation (WHO) recognises that in order to address public health issues on a global scale new strategies must be adopted. With respect to tobacco, in May 1999 the World Health Assembly (the governing body of the WHO) adopted resolution WHA52.18 that initiated work on the Framework Convention for Tobacco Control (FCTC), the first time in its fifty-year history that the WHO had exercised its constitutional right to establish treaties. The Convention is set to come into effect in 2003 and guidelines are being established for all countries regarding effective tobacco control policies.

Secondly, the research regarding advertising and sponsorship highlights the necessity for comprehensive bans. This must include all national and international events, direct and indirect advertising, as well as all other media. With respect to prices and taxation, since price has been shown to have significant impacts on consumption, India’s current state of relatively low cigarette use when compared with overall tobacco consumption indicates that maintaining or increasing tobacco taxes could lead to future reductions in cigarette use.

Smuggling due to illegal TTC activity will continue to be a global issue as long as stringent measures are not taken. Governments should heed the words of BAT executive J. Aitken who says that, “There are basically only two defences against transit [smuggled cigarettes] – firstly determined Gov’t [government] action to prevent it, and secondly a top quality, top image, top price locally manufactured brand.” Since the latter option is not a desirable option for tobacco control advocates, government policies such as harsher penalties, required marking of final destination on labels of exported cigarettes, and markings to prevent the counterfeit production of cigarettes should be enforced. Practises such as these should be applied on global scales, as industry documents are revealing TTC smuggling worldwide regardless of a country’s economic status. Other policy requirements can be formulated enforced regarding warning labels and ingredient listing. An option that is being considered by several countries is that of plain packages carrying only warnings and ingredients, and the name of the product in black letters.

The most effective strategy that can be employed is the sharing of information between all parties involved in tobacco control. This includes actions such as the formation of international databases of health and industry information, and ensuring the transference of tobacco control techniques and resources to countries working to strengthen their tobacco control programmes. Tobacco control activists in LMICs have identified the absence of data, lack of communication networks, minimal means for tobacco control research, and scarcity of financial resources as their primary obstacles. These obstacles are facilitating the entry of TTCs into LMICs and action is urgently needed. Government policies can aid in ensuring that information is disseminated both to other governments and organisations, and also to the general public.

## **Conclusion**

The tobacco control movement in countries such as Canada has been gaining strength in recent decades. Campaigns have been met with both success as well as frustration; however, positive support is gaining momentum. This does not mean that pressure can be relieved. The situation is an interesting one in terms of globalisation and the role of the state: As a global environment is being created in which TTCs can act transnationally, the majority of public health policies are enacted at national levels. Therefore, public health policies in one country cannot guarantee protection in another, although it is encouraging for activists to see statements such as ITC executive S. Misra’s that “our law makers often use the legislation in the above mentioned countries [UK, New Zealand, Australia, Canada], as the basis for fresh legislation in India.”

It is important to realise that policies may have to be tailored to meet the needs of the country. Some aspects of tobacco use in India that must be considered include lack of information reaching people who are illiterate, paucity of studies of the health effects of tobacco, and government encouragement of agriculture. In addition, LMICs often have concerns not encountered in higher-income countries such as revenue from advertising preventing the media from reporting the hazardous effects of tobacco, thus exacerbating the already low level of knowledge regarding tobacco’s harmfulness. The major players involved

in sales may also differ; in high-income countries the market is dominated by seven major international companies, while national tobacco monopolies may exist in other countries.

As globalizing trends continue, new public health risks are arising that have both transnational as well as national implications. As demonstrated with the tobacco control issue, this is requiring innovative public health approaches to be sought. As information is generated and national policies are implemented, awareness of the need for tobacco control is increasing. The changes in human interactions and concepts of social space mean that even as TTCs expand their reach into LMICs, so too are tobacco control supporters. Preliminary exploration of industry documents has created a small window into the internal processes of TTCs and is helping to fuel the tobacco control movement. Further document research, increased knowledge of tobacco-related illnesses, strong government and global initiatives, and vocal activists are powerful tools for addressing changing this public health crisis in a globalising society.

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# THE BIRTH OF GYNECOLOGY: OBSTETRICS IN ANCIENT GREECE AND ROME

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## ABSTRACT

**Most historians regard Soranus of Ephesus (98-138 AD) as the Father of Obstetrics and the foremost gynaecologist of antiquity. His manuscript, *Gynecology or Diseases of Women*, was used until the sixteenth century. He gives instructions on birthing, and describes everything from menstruation, conception, and contraception to the hiring of a wet nurse and the training and personal qualities a midwife should have. Soranus' emphasis on cleanliness and his insistence that midwives wash their hands and use clean cloths probably helped to reduce the infection rate.**

**The most impressive aspect of ancient Greek and Roman medicine was its rationality. Soranus, like Hippocrates, Aristotle, and Galen, emphasized the importance of observation and laid the foundation for gynecology. Ironically, their works were stifled in the idolatry and mysticism of the Middle Ages. Gynecology as a rational and distinct branch of medicine did not take root until the mid 19th century.**

This paper follows a thematic sequence rather than a timeline, and focuses on Soranus of Ephesus. Through quotes from the original sources it gives a glimpse into the way the physicians of classical antiquity thought about the 'diseases of women'.

It is important to note that the early Greek healers practiced all fields of medicine, and thus obstetrics was not considered to be a separate branch. In the absence of hospitals, let alone anaesthetics, giving birth was quite a challenge. This was particularly true if you were a Greek god, and your temperamental offspring insisted on coming out of your head or your thigh, as Athena and Dionysus did from Zeus. Fortunately, most mortal neonates opted for the more traditional route.

One of the first questions to be settled was that of anatomy. The ancients were quick to realize that men and women are not the same. There was debate, however, as to the extent of this difference. Galen (129-200 AD), one of the foremost medical authorities of antiquity, wrote, "All the parts, then, that men have, women have too, the difference between them

lying in only one thing, namely, that in women the parts are within, whereas in men they are outside, in the region called the perineum.”<sup>6</sup>

They also believed that women were colder than men, and therefore inferior. Men and women were distinct not so much because of their genitalia, but because of difference in body temperature.<sup>2,16</sup> After all, they reasoned, it was the lack of heat that caused a woman’s reproductive organs to be held within, instead of properly descending like those of a man. As Galen put it, “...the parts were formed within her when she was still a foetus, but could not because of the defect in the heat emerge and project on the outside...”<sup>6</sup> However, this “...provided no small advantage for the race; for there needs must be a female. Indeed, you ought not to think that our creator would purposely make half the whole race imperfect and, as it were, mutilated, unless there was to be some great advantage in such a mutilation.”<sup>6</sup>

The ancient doctors thought that the uterus was a key determinant of health and the source of no end of trouble.<sup>13</sup> The word “hysteria” comes from Greek and stands for “womb.” Some held that the uterus was capable of moving throughout the body, compressing other organs, and causing diseases unique to women.<sup>11,12,16</sup> According to one of Galen’s contemporaries, Aretaeus of Cappadocia, the uterus “...is very much like an independent animal within the body for it moves around of its own accord and is quite erratic. ...Disorders caused by the uterus are remedied by foul smells, and also by pleasant fragrances applied to the vagina...”<sup>1</sup> The concept of the wandering womb was dismissed by Galen, who called it “fallacious.”<sup>5</sup> Nevertheless, the idea that “the womb is the origin of all diseases of women” was still alive and well in 1564, when Caspar Wolf published his *Harmonia Gynaeciorum*.<sup>16</sup> In ancient Greece, the prevalent thought was that a woman has “an uninterrupted vagina from nostrils to the womb.”<sup>16</sup> This oneness of the top and bottom is reflected in the terminology we use even today: namely, the vagina has *labia*, or lips, and also a *cervix*, or neck.

As in many other cultures, the Greek concept of fertility likened women to the fields into which the farmer sowed seeds. The man’s sperm simply grew within the nutritive and protective environment of the woman’s uterus.<sup>2</sup> Women were thought to absorb more liquids from the diet than men, and this excess had to be excreted in the form of menses.<sup>12</sup> The uterus consisted of three lobes: the left one for the male embryo, the right for the female, and the centre for the hermaphrodite. Although Aristotle denounced the popular practice of tying a cord tightly around the left testicle to increase a man’s chances of having sons, this belief had a remarkable longevity, and only the technique changed with the times. In the 18th century, some French noblemen had their left testicles surgically removed in the hope of producing male successors.<sup>8</sup>

From times immemorial, female relatives have aided women in labour. As early as the fifth century BC, Hippocrates (460-377 BC) gave training for midwives, but the vast majority were uneducated old women, relying on experience and traditions. In this age, it was illegal for women to become physicians. According to myth, a young Athenian named Agnodice disguised herself as a man and studied medicine under the famous physician Herophilus, who is said to be the first person ever to dissect a human body in public.<sup>15,16</sup> When Agnodice went to aide a woman in labour, she was rejected initially because the woman thought that she was a man. But Agnodice lifted her tunic to prove that she was a woman, whereupon her

help was eagerly accepted. Evidently, women were not altogether keen to have strange men poke and prod them when they were most vulnerable. The other male physicians could not understand why Agnodice was so popular among female patients, and accused her of seducing them. In court, Agnodice revealed that she was a woman, but that only served to increase her colleagues' outrage since it was forbidden for women to study medicine. The Athenian court, however, acquitted her and, in an unprecedented move, amended the law in her favour. Agnodice would not have gotten away so easily in Rome.

Curiously, in the early Roman Empire, the Romans regarded themselves as superior to the Greeks, and considered practicing medicine beneath them. Consequently, healing was left to the Greek expatriates, and Greek schools flourished throughout Rome. One of the most notable physicians was Soranus of Ephesus (98-138 AD). Just as Hippocrates is regarded by most historians as the Father of Medicine, Soranus is the Father of Obstetrics and the foremost gynaecologist of antiquity. The manuscript of this Greek expatriate, entitled *Gynecology* or *Diseases of Women*, was used until the sixteenth century.<sup>16</sup> Soranus gave instructions on birthing, and wrote about everything from menstruation, conception, and contraception to the hiring of a wet nurse and the training and personal qualities a midwife should have. He did not limit himself to gynecology, however, and gave the first description of rickets.<sup>7</sup> It is ironic that rickets were prevalent in the sunny Mediterranean, but this is not so surprising if we know that babies were not exposed to any sunshine at all. Soranus prescribed head to foot swaddling for the first two months in the hopes of avoiding what he perceived to be the true cause, namely the unsupervised movements of the infant.<sup>7,16</sup> Alas, he did not trust the Roman mothers, saying, "the women in this city have no great love for their children as to have regard to every particular as the women of purely Greek stock do."<sup>7</sup> As a proud Greek, Soranus never missed an opportunity to point out the superiority of Greece over Rome.

Soranus described different birthing techniques, with the new mother resting on a firm bed if she was weak, or preferably sitting on a birthing stool or in another woman's lap.<sup>20</sup> Pillows and blankets for the newborn, as well as herbs and scents to revive the mother were to be laid out in advance.<sup>20</sup> It was important that the mother be as comfortable as possible, and that she receive emotional support from the midwives in addition to physical assistance. As Soranus wrote:

*Three women should stay ready who are able gently to calm the fears of the woman who is giving birth, even if they do not happen to have experience in childbirth. Two should stand on the sides, and one behind her ... If indeed the amniotic sac remains unbroken for a long time, she should break it with her fingernails and put her fingers in it and little by little open it wider. She should take care that the infant not fall out at once ... the helpers standing on the side, without shaking her and with open hands should bring the uterus downwards. When the infant tries to come out, the midwife should have a cloth in her hands to pick him up.*<sup>20</sup>



Perhaps what is most striking in Soranus' instructions is his emphasis on cleanliness. He insisted that midwives cut their fingernails and wash their hands in hot oil.<sup>20</sup> It is rather revealing and characteristic of the time that he had to specify that this olive oil should not have been previously used in cooking. The mother's vagina should be washed with hot water, and the cloths, compresses, and sponges should also be clean.<sup>20</sup> Infection following childbirth has always been a major cause of death. Thus, Soranus' insistence that midwives wash their hands and use clean cloths must have helped in reducing the infection rate. These basic sanitary measures seem only natural to us now, but unfortunately, physicians of later centuries did not always heed Soranus' measures. While most women gave birth at home, the spread of diseases between patients was not a public health issue but it became of fundamental importance with the establishment of maternity wards in hospitals. When in 1847 the Hungarian physician Ignaz Semmelweiss instituted that doctors wash their hands and change their clothes when going from an autopsy to the delivery room, he was criticized and ridiculed by many of his contemporaries who protested that they were gentlemen, and thus their hands were clean.<sup>17</sup>

Soranus regarded obstetrics as an art, and said that the ideal midwife "...must be literate in order to be able to comprehend the art through theory too".<sup>22</sup> Amongst other qualities, she must be calm, have a good memory, be dedicated, quiet, respectable, and strong, and have long, soft, slim fingers. Indeed, she must be an exceptional woman, for as Soranus explains, "a woman who wishes to acquire such vast knowledge needs manly patience".<sup>22</sup> If there are complications in the birth, the ideal midwife can make a diagnosis, and based on her knowledge of dietary, surgical, and medical treatments, she can prescribe accordingly.<sup>22</sup> At times, Soranus' midwife sounds more like a heroine: "she will be unperturbed, unafraid in danger, able to state clearly the reasons for her measures, she will bring reassurance to her patients, and be sympathetic."<sup>22</sup> He writes with equal eloquence about what a midwife should not do. For example, it is not necessary that the midwife be young or have children of her own, but she must not be prone to gossip, superstition, greed, or alcohol, because this would endanger her patients.<sup>22</sup>

Five hundred years before Soranus, Hippocrates described several diseases and complications of pregnancy. Some of these diseases were associated with the smoothness of the uterus, and bleeding during pregnancy.<sup>12</sup> Hippocrates emphasized the importance of accurate history taking several times when discussing gynecology.<sup>12</sup> His list of causes of miscarriage is a comprehensive one, which with some paraphrasing would stand up to scrutiny even today:

*There are also many other dangers by which embryos are aborted; if, for example, a pregnant woman is sick and weak, and if she picks up a burden with all her bodily strength, or if she is beaten, or leaps into the air, or goes without food, or has a fainting spell, or takes too much or too little nourishment, or becomes frightened and scared, or shouts violently. Nurture is a cause of miscarriage, and so is an excessive drink.*<sup>12</sup>

Evidently, foetal alcohol syndrome is not just a modern phenomenon.

Hippocrates used the analogy of an olive pit coming out of a small-mouthed oil flask to explain the difficulties caused by lateral and breech-birth positions: "...many times the women die, or the children, or even both. A major cause of the embryo not going out easily is if it is dead, or paralysed, or if there are two of them."<sup>12</sup> Hippocrates regarded childbirth as being similar to the hatching of a chick, where the baby actively tries to break free of the confines of the mother's womb, which is the egg. However, when things did not go smoothly, and the mother died, a Caesarean section would be performed.

Contrary to common belief, Caesarean section has nothing to do with Julius Caesar's birth as the name would imply. The Caesarian probably derives its name from the *lex caesare*, or the Caesarean law of Numa Pompilius, who ruled from 715 to 615 BC. According to this law a deceased pregnant woman could not be buried until the foetus was removed.<sup>7</sup> This law came into being about 600 years before Caesar's birth in 100 BC. However, Caesareans on live mothers were only seldom performed, because it was almost always fatal for the mother. Alas, the infant's chances of survival were only marginally better.

Obviously, in order to perform any sort of gynaecologic surgery and also to see what they were doing, the early obstetricians needed instruments such as the vaginal speculum to dilate the opening to the vagina. Rather like a compass, the speculum had a handle that could be turned to force two or three blades apart. The vaginal speculum was first described by none other than Soranus, and remained basically unchanged until the 20th century. The ancient Greeks and Romans also employed a variety of blunt and sharp hooks in their obstetrical explorations. These hooks were used in partial birth abortions and extraction of the foetus in the case of difficult births. Soranus described in detail "how to recognize the newborn who is worth rearing".<sup>7</sup> However shocking it is to us, infanticide after birth was not a crime and was practiced not only in draconian Sparta<sup>16</sup>

After the trauma of birth, the new mother had to be prepared to face a different set of demands. Fortunately, Soranus of Ephesus also gave instructions on the care and feeding of neonates. He specified that newborns be given "boiled water and honey ... for the first two days, then on to the mother's breast."<sup>21</sup> It is interesting to note that the water and honey were boiled. Apparently Soranus knew that raw (unpasteurised) honey should not be given to infants. The ancient Greek mothers breastfed their children for three years.<sup>16</sup> It is no wonder that Soranus viewed the Roman women as comparatively negligent.

The most impressive aspect of ancient Greek science and medicine was its rationality. In contrast, the more ancient Egyptian medicine, despite its breathtaking successes in embalming, was held back by its belief system, in which diseases were attributed to supernatural forces.<sup>3</sup> The empirical Greek scientists' passion for searching for rational explanation behind all phenomena was the most important of the forces that led to stunning achievements in many disciplines. Several physicians, like Aristotle, Hippocrates, Soranus and Galen, were also philosophers, and in their writings they reveal the supremacy of analysis and logical thought over superstition, and emphasize the importance of observation. Some of their mistakes and theories may be obvious or even hilarious to us now. Nevertheless their works laid the foundation for the development of rational and scientific

methods in treating women. They added more to the art of medicine than what was accumulated in almost a thousand years following.<sup>3</sup>

For centuries to come, the Greek traditions were kept alive by Arab physicians, most notably by Ibn Sina (Avicenna, 980-1036 AD).<sup>7</sup> Ironically, in Europe, the works of the very physicians who placed such a high value on rationality and observation were mired in the slavish idolatry and irrational mysticism of the Middle Ages, when treatments of women often focused on exorcism. After this long stagnation, the Renaissance and the early Industrial Age brought along some important advances in medical knowledge, alas not so much in the diseases specific to women.<sup>18</sup> Thus, gynecology as a rational and distinct branch of medicine did not take roots until 1854, when J. Marion Sims established the first Woman's Hospital in New York.<sup>4,10</sup> A mere fifty years later, gynaecological surgery made up one quarter of all operations.<sup>10</sup> Today, despite a newly fashionable trend towards home births, most deliveries, not to mention surgeries, take place in the safety of hospitals.

Clearly, we have come a long way since the age of the Graeco-Roman medicine; nevertheless we have to acknowledge our debt to Soranus and his colleagues for taking the first significant steps on this long obstetrical journey.

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# **"UNTIMELY RIPP'D" CAESAREAN SECTION - A BRIEF HISTORY**

By

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Preceptor: None

## **ABSTRACT**

One of the oldest surgical procedures practised by man, the "caesarean section" holds an almost mythical, certainly mysterious status in both human and medical history. Indeed, Apollo took the Greek god of medicine himself, Asclepius, from his slain mother's abdomen. Likewise, Buddha is said to have been brought into this world through the flank of his mother, Maya. In the literary world, Shakespeare's Macduff states that he "was from his mother's womb untimely ripp'd" in the closing scenes of *Macbeth*. Once only indicated as a procedure to save an unborn child from a dying or dead mother, the "C-section," as it is now known, has undergone a remarkable transformation since its first conception, also a topic of great debate. The term "caesarean," once thought to refer to the surgical birth of Julius Caesar, is likely derived from Latin origins; "caedara" meaning to cut and "caesones" referring to infants born to deceased mothers. Sadly, it is likely that the true origins may never be known and will be fuel for speculation and debate for times to come. Known as the "caesarean operation" until the sixteenth century, the term "section" was introduced by Jacques Guillimeau in his book on midwifery. Very rarely was a mother expected to live following the procedure, for in fact the operation was normally only attempted on mothers who were already deceased, in a last ditch effort to save the child inside her. Today, the procedure is performed quite frequently, under a variety of indications, commonly with very little morbidity to either child or mother. With advances in surgical technique and anaesthesia, increases in knowledge about human anatomy and the establishment of the germ theory, the caesarean section has become a regular and routine procedure in the modern obstetrician's skill set.

This paper seeks to explore and review the history of the caesarean section from ancient times to modern day practise by examining the aforementioned examples as well as many other interesting and fascinating chronicles.

"Caesarean section" refers to the procedure by which the unborn child is delivered through an incision in the abdominal wall and the uterus of the mother. It has been a part of human culture since ancient times and enjoys a rich and colourful history befitting such a storied and practically mythical procedure. A complete and extensive history would fill volumes of texts that would boggle the minds of the casual historian and the curious medical student, both hoping to learn a little more about their chosen profession or perhaps just pick up some

interesting trivia. Hence I present to you the following: a brief history of the caesarean section.

No one can ever say definitively when the first caesarean section was performed. It is thought that the procedure was in practice in Ancient Egypt and India first but proof has been based upon speculation and supposition. Numerous references to “caesarean-like” operations appear in ancient Hindu, Chinese, Grecian, Roman, and other European folklore. The oldest authenticated record of a living child thus born was Gorgias, son of a celebrated orator of Sicily in 508 B.C., delivered after his mother had succumbed to the rigours of a difficult labour. Indeed, the procedure was almost always performed on a dead mother, as the possibility of the mother surviving the procedure was incredibly remote. A law known as the Lex Regia, enacted by Numa Pompilius, an early king of Rome, in 600 B.C. expressly commanded the removal of the child before the burial of the deceased mother. It is not clear whether this practice was of religious significance or had a more secular purpose, perhaps an attempt to save the child as a potential future citizen of Roman society.

There has always been a great deal of debate about the origins of the term “Caesarean Section.” Many laypersons and physicians alike believe the name refers to the birth of Julius Caesar. While this is a romantic notion, it is likely in error. Caesar’s mother, Aurelia, was very much alive when he was ruler of the Roman Empire. Given the near-universal mortality associated with caesarean delivery, it is very unlikely that Caesar was born thus, dispelling the popular myth. One possibility for the name’s origin may lie in its Latin origins; the verb “caedere,” meaning to cut, and the term “caesones” that was applied to infants born by postmortem operations. Yet another may lie in the Lex Regia which remained in Roman law until the time of the Caesars and was renamed the “Lex Caesarea.”



**Figure 1**

While it is unlikely that Julius Caesar was born by caesarean section, it is most interesting to note the ones who were, or at least so the stories are told. Shakespeare’s Macduff was able to foil destiny and Macbeth, who proclaimed to live “a charmed life, which must not yield one of woman born.” And he did not, for Macduff, who defeated Macbeth, was “from his mother’s womb untimely ripp’d,” referring to a surgical birth. Furthermore, in an odd irony which surely must please obstetricians and gynecologists, Asclepius, the greek god of medicine, is proclaimed to have been delivered through his mother’s abdomen by his father Apollo.



**Figure 2**

During its evolution cesarean section has meant different things to different people at different times. The indications for it have changed dramatically from ancient to modern times. Despite rare references to the operation on living women, the initial purpose was essentially to retrieve the infant from a dead or dying mother; this was conducted either in the rather vain hope of saving the baby's life, or as commonly required by religious edicts, so the infant might be buried separately from the mother. Above all it was a measure of last resort, and the operation was not intended to preserve the mother's life. There were, though, sporadic early reports of heroic efforts to save women's lives. And while the Middle Ages have been largely viewed as a period of stagnation in science and medicine, some of the stories of caesarean section actually helped to develop and sustain hopes that the operation could ultimately be accomplished. It was not until the nineteenth century that such a possibility really came within the grasp of the medical profession.

Perhaps all of this changed in a tiny village in Switzerland around the year 1500. A sow gelder by the name of Jacob Nufer, dismayed by the agony and pain of his wife's labour, sought the help of no less than thirteen midwives to deliver their child and relieve his wife. For days they tried, and failed. When he could stand no longer to see his wife suffer, Nufer asked his wife if she would have the confidence in him to perform the operation. She agreed. Nufer sought permission from the local authorities, who initially refused but eventually relented to Nufer's persistent pleas. Nufer's wife lived following the operation and eventually gave birth to five more children, all vaginally, including one set of twins.

The history of caesarean section can be understood best in the broader context of the history of childbirth and general medicine histories that also have been characterized by dramatic changes. Many of the earliest successful caesarean sections took place in remote rural areas lacking in medical staff and facilities. In the absence of strong medical communities, operations could be carried out without professional consultation. This meant that caesareans could be undertaken at an earlier stage in failing labor when the mother was not near death and the fetus was less distressed. Under these circumstances the chances of one or both surviving were greater. These operations were performed on kitchen tables and beds, without access to hospital facilities, and this was probably an advantage until the late nineteenth century. Surgery in hospitals was bedeviled by infections passed between patients, often by the unclean hands of medical attendants. These factors may help to explain such successes as Jacob Nufer's.

One explanation for Nufer's success was his knowledge of anatomy, albeit bovine instead of human. One of the first steps in performing any operation is an understanding the organs and tissues involved, knowledge that was scarcely obtainable until the modern era. During the sixteenth and seventeenth centuries with the blossoming of the Renaissance, numerous works illustrated human anatomy in detail. Andreas Vesalius's monumental general anatomical text *De Corporis Humani Fabrica*, for example, published in 1543, depicts normal female genital and abdominal structures. As well, medical education would be revolutionized by the removal of barriers to cadaveric dissection, which would increase not only anatomical knowledge but improved a surgeon's understanding of the relevant anatomy and better prepared them to undertake operations through practical experience.



**Figure 3**

For a variety of reasons, obstetrics in the nineteenth century, like much of medicine, remained a profession dominated by men. Access to medical education was primarily permitted for men only and with the invention of the Chamberlen obstetrical forceps and men's claims of authority over such instruments, male dominance of the field persisted throughout the century. However, in an ironic twist, the first recorded, successful caesarean performed in the British Empire was conducted by a woman. Sometime between 1815 and 1821, James "Miranda" Stuart Barry performed the operation while masquerading as a man and serving as a physician to the British army in South Africa.

While many of the earliest reports of caesarean section issue from remote parts of Europe and the United States and from places far removed from the latest developments in Western medicine, it was only with increased urbanization and the growth of hospitals that the operation began to be performed routinely. Most rural births continued to be attended by midwives in the late nineteenth and early twentieth centuries, but in the cities obstetrics -- a hospital-based specialty -- squeezed out midwifery. In urban centers large numbers of uprooted working class women gave birth in hospitals because they could not rely on the support of family and friends, as they could in the countryside. It was in these hospitals, where doctors treated many patients with similar conditions, that new obstetrical and surgical skills began to be developed.



During the nineteenth century, however, surgery was transformed -- both technically and professionally. A new era in surgical practice began in 1846 at Massachusetts General Hospital when dentist William Morton used diethyl ether while removing a facial tumor. This medical application of anesthesia rapidly spread to Europe. In obstetrics, though, there was opposition to its use based on the biblical injunction that women should sorrow to bring forth children in atonement for Eve's sin. This argument was substantially demolished when the head of the Church of England, Queen Victoria, had chloroform administered for the births of two of her children (Leopold in 1853 and Beatrice in 1857). Subsequently, anesthesia in childbirth became popular among the wealthy and practical in cases of caesarean section.

As the rate of urbanization rapidly increased in Britain, throughout Europe, and the United States there arose at the turn of the century an increased need for cesareans. Cut off from agricultural produce and exposed to little sunlight, city children experienced a sharply elevated rate of the nutritional disease rickets. In women where improper bone growth had resulted, malformed pelvises often prohibited normal delivery. As a result the rate of caesarean section went up markedly. By the 1930s, when safe milk became readily available in schools and clinics in much of the United States and Europe, improper bone growth became less of a problem. Yet, many in the medical profession were slow to respond to the decreased need for surgical delivery. After World War II, in fact, the caesarean section rate never returned to the low levels experienced before rickets became a large-scale malady, despite considerable criticism of the too frequent resort to surgery.

Since 1940, the trend toward medically managed pregnancy and childbirth has steadily accelerated. Many new hospitals were built in which women gave birth and in which obstetrical operations were performed. By 1938, approximately half of U.S. births were taking place in hospitals. By 1955, this had risen to ninety-nine percent.

Which brings us to the present. Currently in the United States slightly more than one in seven women experiences complications during labor and delivery that are due to conditions existing prior to pregnancy; these include diabetes, pelvic abnormalities, hypertension, and infectious diseases. In addition, a variety of pathological conditions that develop during pregnancy (such as PIH, eclampsia and placenta previa) are indications for surgical delivery. These problems can be life-threatening for both mother and baby, and in approximately forty percent of such cases caesarean section provides the safest solution. In the United States almost one quarter of all babies are now delivered by caesarean section -- approximately 982,000 babies in 1990. In 1970, the cesarean section rate was about 5%; by 1988, it had peaked at 24.7%. In 1990, it had decreased slightly to 23.5%, primarily because more women were attempting vaginal births after caesarean deliveries.

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# THE HISTORY OF ORAL CONTRACEPTION

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## ABSTRACT

Since ancient times, women have sought ways to control their fertility in an attempt to find a perfect contraceptive. Despite a primitive understanding of body function and a reliance on ritualized behavior, barrier methods, spermicidal agents, oral contraceptives and other methods appeared to have been used. Although early contraceptives lacked scientific basis, it is likely that several methods were, in fact, effective in preventing unwanted pregnancies, and were passed along to the next generation.

Throughout history, women have ingested a variety of substances to prevent pregnancy. Early oral contraceptives often contained herbs, but some contained other substances such as metals and animal products. Although the difference between contraception and abortion was recognized in Ancient Greece, it is likely that many of these oral contraceptives functioned as abortifacients. In the early 1960's, the arrival of the birth control pill revolutionized contraception. The "Pill" was designed to be the perfect contraceptive, safe and reliable, but while it has reached unprecedented levels of acceptance among women and physicians, side effects are still a cause for concern.

## Ancient Egypt

The earliest known contraceptive prescription dates back to 1850 BC from the Ancient Egyptian Kahun Papyrus (Robertson 1990). The Kahun papyrus described three contraceptive recipes, all of which were to be inserted into the vagina. One consisted of crocodile dung paste, another contained honey and sodium carbonate, and the third was composed of a gum-like ingredient (Himes 1963, Robertson 1990). Ancient Egyptian records also include the earliest reference to oral contraception in the Berlin Papyrus dating from 1300 BC (Riddle 1992). The method used involved fumigating the uterus, and after coitus, removing the semen by a potion containing 5 parts oil, 5 parts celery, and 5 parts sweet ale which was heated and drank for four mornings (Riddle 1992).

## Ancient Greece

Contraception advanced and flourished during Ancient Greco-Roman times. In Ancient Greece, several methods were referred to in works of Aristotle, Hippocratic writers, Lucretious, Pliny the Elder, Dioscorides, Aetios, Oribasios, and most notably, Soranus (Himes 1963). A bean-sized amount of “Misy,” a substance composed of copper sulfate and other metals, dissolved in water and drunk was believed to cause infertility in a woman for one year (Himes 1963, Noonan 1986). This recipe dates back to Hippocratic writings of 4<sup>th</sup> to 5<sup>th</sup> century BC, and is the first known example of contraception used in Ancient Greece (Himes 1963). Dioscorides, an ancient writer of pharmacology, prescribed potions to induce temporary infertility (Himes 1963). Some formulations were willow leaves in water, ground barrenwort leaves, cabbage flowers, ferns and iron rust and slag, a practice originating from a false association between sterile metals and sterility (Noonan 1986, Himes 1963, Riddle 1992). Soranus of Ephesus, a prominent gynecologist who practiced medicine from 98-138 AD, realized that preventing conception was safer than destroying the embryo (Soranus 1991). Soranus clearly differentiated contraceptives (*atokion*) from abortifacients (*ekbolion*) (Soranus 1991). Other popular oral contraceptives used in Ancient Greece contained silphium balm, rue, wallflower seed, myrtle, myrrh, white pepper, rocket seed and cow parsnip (Soranus 1991). Many of these recipes not only were capable of preventing conception but also destroyed pre-existing life (Soranus 1991). Oral contraceptives were not commonly recommended because they caused upset stomach, headache and other negative effects (Soranus 1991). Roman woman drank myrtle tea during menstruation to prevent pregnancy (Himes 1963). Silphium, an extinct species of the giant fennel family, was claimed to be the greatest contraceptive of all time and was highly valued in Ancient Greece (Riddle 1992). Recent animal studies show that other members of the ferula species have contraceptive effects (Riddle 1992).

## Near East

Arabic physicians regarded contraception as a part of medicine and thereby expanded the contraceptive methods used in Ancient Greece and Rome. Islamic medicine mainly dealt with female methods of birth control, specifically, vaginal suppositories and oral potions (Musallam 1983). The primary Arabic medical text dealing with contraception is Razi's *Hawi* from the 9<sup>th</sup> century (Musallam 1983). It contained 176 contraceptive or abortifacient recipes (Musallam 1983). Some oral contraceptives described by Razi include: the juice or root of the cyclamen, wallflower broth, willow leaves, cinnamon and myrrh, luffa seeds combined with water and vinegar, and wild rue seeds (Musallam 1983). Avicenna along with other Islamic physicians recommended drinking three pints of sweet basil water to prevent conception (Musallam 1983, Himes 1963). One interesting contraceptive beverage was the foam from the mouth of a male camel in rut, a recipe that reappeared in Algeria in the early 20<sup>th</sup> century (Musallam 1983). Frequent ingredients of potions included white poplar leaves, clove, barrenwort, pepper, ginger, cabbage seeds, cucumber leaves, watercress, mulberry rind, and sesame juice (Musallam 1983, Himes 1963). Bizarre oral potions believed to prevent conception include urine of a mule with fire bucket water, mule dung with honey, sea wave foam, workhorse blood and ram urine (Himes 1963, Musallam 1983).

## China

One of the earliest discussions of contraception in China appears in Chi'en ching fang "Thousands of Gold Contraceptive Prescriptions" written by Sun Ssu-mo in the 7<sup>th</sup> century (Himes 1963, Lal 1966). To prevent pregnancy forever without harmful consequences, this text suggests swallowing a pill made of quicksilver on an empty stomach (Himes 1963). A popular oral contraceptive was swallowing sixteen tadpoles fried in mercury (Robertson 1990). Some oral potions contained barley, leaven made of wheat flour and kidney beans, canola seeds, apricot kernels, Angelica polymorpha, Paeonia albiiflora, and Conioselinum univittatum (Lal 1966, Robertson 1990, Himes 1963). One text of the 1500's warned that many contraceptive recipes pose more danger than either pregnancy or childbirth (Himes 1963). Some women drank white lead every month to prevent conception and cause cessation of menstruation (Himes 1963). This method likely works since lead causes sterilization (Himes 1963). Interesting, in the 11<sup>th</sup> Century, Chinese used androgens and estrogens to treat sexual disorders, using the placenta as source of estrogen. (Riddle 1992). As many as 250 plants used in traditional Chinese medicine have potential antifertility effects, but it is difficult to determine their effectiveness and to classify them unless there is further research (Kong et al. 1976).

## India

Knowledge regarding contraception in Ancient India is limited despite its rich display of sexual life in art and literature (Himes 1963). Known texts discussing contraception such as the Bridhayogatarangini appeared around the eighth century but referred to earlier works. Substances taken by mouth were a common method of contraception in India. Nineteen prominent formulations of oral contraceptives appear to be used (Himes 1963). Some typical examples of the potions are the following: three year old molasses, palm tree and red chalk, ground mustard seed in sesame oil, *agni* tree roots (*Semecarpus anacardium*, *Plumbago zeylanica* or *Citrus acida*) cooked in sour rice water and pepper, *windanga* and borax in milk (Himes 1963).

## The Americas

Contraception used by the early inhabitants of the Americas is a mystery because little information was recorded despite its existence in oral tradition. Looking at surviving rituals specific to each group shed some insight into their contraceptive practices. Several aboriginal groups relied on special herbal potions to achieve temporary sterility. Other common herbs used orally to prevent pregnancy include cowbane, cypress, dogbane, water hemlock, milkweed, and thistle (Himes 1963, Riddle 1997, Weiner 1998). Unique potions include ingesting "red burned earth beneath the fire" by White Apache women, scrapings of antlers by Cora women (Himes 1963), and dried beaver testicle in alcohol by east coast Canadian Indians (Stieb 1989). Aztec and Mexican medicine used *Montanosa tomentosa* for the treatment of women's problems that likely worked because the plant contains a number of progesterone-like steroids (Gallegos 1983, del Pozo 1966). Interestingly, Aztec medicine used *cabeza de negro* which is the same plant initially used as a source of progesterone for the modern pill (del Pozo 1966).

## Europe

Christianity's taboo on sexual relations and its condemnation of birth control severely limited the advancement of contraception and resulted in the loss of knowledge regarding birth control practiced in earlier civilizations. One disturbing example displaying the regression of contraceptive knowledge was the practice of hanging the finger and anus of a dead fetus around a woman's neck to prevent conception while it was worn (Himes 1963). Oral potions were common in this period. Drinking blacksmith's water to prevent pregnancy persisted from Ancient Greece (Himes 1963). Other oral potions used to prevent pregnancy contained the chaste tree, garlic, aloe, camphor, hemlock, gourds, lettuce, portulaca, lead tincture and rue (Noonan 1986, Himes 1963). Teas containing marjoram, thyme, parsley and lavender were used as contraceptives and abortifacients in German folk medicine (Himes 1963). Similar to the idea that sterile animals like the mule caused sterility, people also believed that teas of fruitless plants had a contraceptive effect (Himes 1963).

## The Pill

In 1927, an Austrian named Ludwig Haberlandt had the idea of creating a hormonal contraceptive pill, but at the time, knowledge of reproduction and fertilization was limited (Marks 2001). In the 1930's, progesterone and estrogen were isolated and associated with inhibiting ovulation (Marks 2001). The first orally active progesteronal agent was synthesized by Hans H. Inhoffen (Robertson 1990). Because isolation of hormones from animal sources was so expensive and had such small yield, the possibility of using plants to synthesize hormones was investigated (Robertson 1990). Russell Marker, a chemist, learnt that the yam family particularly *cabeza de negro* were rich sources of saponogenins, soap-like compounds having a steroid nucleus (Robertson 1990). He went to Mexico and manufactured progesterone by modifying the sapogenin from the plant (Robertson 1990, Asbell 1995). Marker decided to work for Syntex but a dispute caused him to leave and quit research. Carl Djerassi continued Marker's work on the synthetic progesterone (Robertson, 1990). Syntex and Djerassi applied to patent norethindrone in 1951 (Asbell 1995), which was used to treat gynecological problems in 1954 (Robertson 1990). Another company, Searle applied to patent a similar substance called norethynodrel in 1953 (Asbell 1995). Margaret Sanger, one of the founders of the birth control movement in North America and a prominent birth control advocate, approached Gregory Pincus to create a perfect contraceptive (Asbell 1995). Pincus collaborated with research Dr. Min Cheuh Chang and clinical Drs. John Rock and Celso Garcia (Robertson 1990). Studies of women from Puerto Rico, Haiti and Mexico City began in 1956 (Robertson 1990). By 1960, the FDA approved Enovid by the Searle Company and in 1962, Ortho Novum, the Syntex formula, by Ortho Pharmaceuticals as oral contraceptives.

The contraceptive Pill is often viewed as one of the greatest advancements of the 20<sup>th</sup> century by finally giving women control of their bodies (Marks 2001). Its early acceptance shows women were desperate to find a convenient, effective way to prevent conception (Tyrer 1999). In 1961, an estimated 408,000 American women used the pill and by 1967, the number had increased to over 12.5 million (Tyrer 1999). From its first clinical trials to

present, approximately 200 million women have taken the pill, and currently, an estimated 70 million women are on the pill (Marks 2001). The pill was unique in that it is taken orally, separate from the sexual act, and could be used discreetly without the involvement of their partner (Marks 2001). Nearly 100% effective, the pill revolutionized contraception (Marks 2001).

Despite its overwhelming acceptance, the Pill has not been the perfect solution as envisioned by its creators since it is still too costly for the poor, does not protect against STDs, has possible side effects and is not universally accepted (Marks 2001).

Safety of the pill was of common concern among women. High hormone doses used in the early pill often were associated with headache, nausea, dizziness, water retention, breast tenderness, acne, and mood changes (Marks 2001, Tyrer 1999, Corson, Deman & Tyrer 1994). A few years after FDA approval, high-dose oral contraceptives were associated with increased risks of venous thromboembolism, stroke and myocardial infarction especially in women with pre-existing health conditions and those who smoked (Tyrer 1999). To reduce the adverse effects of the pill, pharmaceutical companies altered the formulations and substantially reduced the amount of hormone in the pill. (Tyrer 1999) The progesterone-only pill was introduced in 1973, and was followed by the introduction of biphasic and triphasic pills in early 1980's (Tyrer 1999). Research has revealed that taking the pill has associated health benefits aside from the prevention of pregnancy. These include decrease in menorrhagia, dysmenorrhea, premenstrual tension and a decrease in iron deficiency anemia (Corson et al. 1994). It also lowers the incidence of benign cystic disease of the breast, pelvic inflammatory disease, ectopic pregnancy, endometrial and ovarian cancer, rheumatoid arthritis, and ovarian cysts (Corson et al. 1994)

## Conclusions

The history of contraception leading up to the development of the modern contraceptive pill demonstrates complexity and variation. Though many early contraceptives appear esthetically unpleasant and seem to lack scientific insight, their effectiveness remains a mystery. Did women effectively find ways to control their fertility using early forms of contraception or simply resort to these methods out of desperation? As society develops and women are further dissociated from traditional role of being barefoot and pregnant, the science of contraception will surely evolve.

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# **CATCHING BABIES THEN AND NOW (OBSTETRICS IN CALGARY 1884-2002)**

By

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## **ABSTRACT**

**The first white baby was born in Calgary in November, 1883. The baby's name was John Calgary Costello and Dr. Andrew Henderson was present at the birth. At the time this baby was born, there was only a one-room North West Mounted Police Hospital in Calgary. The arrival of the Canadian Pacific Railway in 1883 and the official incorporation of Calgary as a town in 1884 marked the start of Calgary's rapid population expansion. In 1884 the population of Calgary was 506 people. By 1910 the population had exploded to 40,000 people. Due to this rapid population growth, the hospitals were struggling to keep up with the demand for beds. Obstetrical beds were in particularly short supply. Hospitals and maternity blocks were constructed in an effort to alleviate the shortage. Many aspects of delivering Calgary's babies have changed since 1884, and many have stayed the same. Patient teaching, clinical knowledge, practitioners, pain management, contraception, cost and complications have changed. Other aspects, such as anatomy and physiology of women, bed shortages and ethical debates remain the same.**

## **Calgary's Population Growth and Early Hospitals**

Before the arrival of the Canadian Pacific Railway (CPR) to Calgary in 1883, Calgary was very sparsely populated<sup>1</sup>. Since the arrival of the CPR and with Calgary's official incorporation as a town in 1884<sup>1</sup>, the population of Calgary has been growing. In 1884 the population of Calgary was 506 people<sup>1</sup>. By 1910 the population had grown to 40,000 and was growing at a rate of 1,000 per month<sup>1</sup>. In 1976 the population of Calgary was 470, 043 and by 2001 the population had soared to 876,519<sup>2</sup>. While the absolute population was much higher in 2001, the growth rate from 1976 to 2001 was 86% whereas the growth rate from 1884 to 1910 was 7,805%.

Because of the rapid expansion of the population in Calgary's early days, the hospitals struggled to keep up with the demand for beds. Prior to the arrival of the CPR, the Northwest mounted police had a one room hospital in the Calgary region<sup>1,3,4</sup>. The first Calgary General Hospital opened on November 24, 1890<sup>1</sup>. This hospital was a two storey house and was referred to as the "Cottage Hosptial"<sup>1</sup>. The original medical staff of the Calgary General Hospital consisted of 7 physicians and one head Matron, Mrs. Elizabeth Hoade<sup>1</sup>. Mrs. Hoade



was a nurse and her husband was retained as the night nurse and general handy man. Jointly, their salary was \$40.00 per month<sup>1</sup>.

Infection control at the time was limited to having a basin of carbolic solution at the front door in which the physicians were expected to immerse their hands upon entering<sup>1</sup>. The dining room was also the operating room and the dining table was the operating table<sup>1</sup>. If a patient was being roomed in the dining room, he or she was simply moved to the hallway for the duration of the surgery<sup>1</sup>. The surgeons were expected to supply their own towels, gowns, gloves, some instruments, suture material, and aprons<sup>1,4</sup>.

Although the first Calgary General Hospital was originally built for eight patients, cots were set up to accommodate additional patients<sup>3</sup>. By January 1891, just months after opening, the Calgary General had an insufficient capacity to serve Calgary's growing population. The hospital was full and patients were being turned away and placed on a waiting list<sup>1</sup>. Consequently, a second Calgary General was opened on May 22, 1895<sup>1</sup>. The capacity of this new hospital was 35 beds<sup>1</sup>. Obstetrical cases grew at a rapid rate and there was inadequate accommodation for them in the hospital<sup>1,4</sup>. This prompted the construction of a maternity block in 1899 which also served as a nurses' residence<sup>1,4</sup>. By 1905 the population of Calgary was 12,500 and the new maternity hospital was no longer adequate<sup>4</sup>. In 1905, at a cost of \$11,000 a new maternity hospital with 16 beds was approved and built<sup>4</sup>. Construction began on the third Calgary General Hospital in 1908<sup>1</sup>. It opened on February 10, 1910 with accommodation for 160 patients: 20 obstetrical beds, 60 private beds and 75 public ward beds<sup>4</sup>. When it opened, the third Calgary General Hospital was reputed to be one of the most modern hospitals in Canada<sup>4</sup>. During the early part of the 20<sup>th</sup> century, there were also four Holy Cross Hospitals<sup>3</sup> and a home/hospital for unwed mothers<sup>5</sup> that struggled to meet the medical needs of Calgary's rapidly growing population.

The demand for obstetrical beds in Calgary continued to grow and in 1924 the Salvation Army bought a building to convert into the Grace Maternity Hospital<sup>5</sup>. This hospital was opened in 1926 with services that focused on care for unwed mothers<sup>5</sup>. In 1950 the demand for these services grew and plans to expand the hospital were made<sup>5</sup>. The expanded hospital was opened in 1954<sup>5</sup>. The continued high demand for maternity beds catalyzed further expansions in 1958 and 1967<sup>5</sup>. The Grace women's hospital programs have now been re-located to the grounds of the Foothills hospital<sup>5</sup>. Currently in Calgary, women choosing to deliver their babies in hospital can deliver at the Peter Lougheed Hospital, the Rockyview Hospital or the Foothills Hospital.

### **The Practice of Obstetrics in Calgary**

Many aspects of delivering Calgary's babies have changed since 1884 and many have stayed the same. Changes in patient teaching, knowledge, practitioners, pain management, contraception, costs, and complications in the obstetrical field will be examined.

## Patient Teaching

The information available to patients and the accuracy of this information has improved dramatically since the 1880s. Mrs. Charles Brown, was a midwife in the Calgary area from 1904-1939<sup>6</sup>. Among her resources was a book entitled “The Wife’s Handbook” and subtitled “How a woman should order herself during pregnancy, in the lying-in room, and after delivery”. This book was written by H. Arthur Allbutt in 1888<sup>7</sup>. Chapter 1 begins with the words:

*From the first marriage night, no woman under forty-five years of age can consider herself safe. She may at any time conceive and therefore it is necessary that she should know what are the signs of pregnancy, especially those earlier ones, an acquaintance with which may save her from much bad health. (p. 5)*

The author goes on to describe the subjective symptoms of pregnancy as: “stoppage of the usual monthly flow, sickness in the morning, dribbling of the saliva from the mouth, toothache, changes in the appetite, longings for unsuitable articles of food and quickening” (p.5). The objective signs of pregnancy are described as: “largeness of the body, changes in the size and color of the breasts, milk in the breasts, the sound of a child’s heart heard when the ear is placed on the woman’s abdomen or body, enlarged veins in the legs and elsewhere, a violet hue of the vaginal passage, and an alteration in the neck and mouth of the womb” (p.5-6).

These early patient teachings are in contrast to the many pre-conception and pre-natal teachings that are offered to women today through their physicians, doulas, midwives, the Internet, resource books, and outreach classes. Women today are also able to objectively know they are pregnant long before the sound of the heart can be heard by placing the ear on the woman’s abdomen or body.

The concept of mind-body health has obviously resonated for many years. In the introduction to “The Wife’s Handbook”, Allbutt (1888) explains the importance of women looking after their bodies during pregnancy. He states:

*A knowledge of health is necessary to every man and woman; but how much more so to the young wife who in entering upon the anxious period in which another life is bound up with her own! To her, health-both of mind and body-is all-important; and yet how many err through ignorance of nature and her unchanging laws, embittering their own existence during the months of pregnancy, and bringing into the world feeble and puny children, born but to suffer and die (p.3).*

## **Knowledge**

Modern medicine is largely evidence based. The following examples of what was being taught to nurses and what was being discussed at medical staff meetings demonstrate that medicine in the early 1900s was based on tradition, experience and instinct.

Miss Garstang was a nursing student in Calgary in the early 1900s<sup>8</sup>. Her notes from a lecture given by Dr. Cooke describe in detail the extensive post natal care of both the mother and the infant<sup>8</sup>. It is documented that the baby should be bathed approximately six hours after birth<sup>8</sup>. Nutritional advice given to the nursing mother includes eating plenty of wholesome food<sup>8</sup>. Specifically, “[a]lmost all vegetables that grow underground make milk, but the most important one is the beet” (March 21, 1907 lecture).

At a staff meeting for the employees of the Calgary General Hospital in May 1925, one of the physicians, Dr. MacPhatter, presented a case on ectopic pregnancy<sup>9</sup>. After presentation of this case, the minutes reflect that a debate ensued regarding whether or not ovulation occurs every month and whether women can get pregnant at any time during the month<sup>9</sup>. The debate concluded happily and the minutes report that “[t]he paper was interesting and enjoyed by all”(p.1). This is in sharp contrast to the currently available knowledge of the timing of ovulation and its association with fertility.

## **Practitioners**

The first white baby was born in Calgary in November 1883<sup>4</sup>. The baby’s name was John Calgary Costello and Dr. Andrew Henderson was present at the birth<sup>4</sup>. All of the early physicians in Calgary were male<sup>1,3,4</sup>. There were, however female midwives practicing in the area<sup>6</sup>.

Until 1944 Obstetrics and Gynecology was not recognized as a distinct specialty<sup>10</sup>. Deliveries were attended by general practice physicians and if surgical intervention was necessary, general surgeons were called<sup>10</sup>.

Obstetrics has had an interesting gender distribution of practitioners in recent western history. Births were originally attended only by midwives (men were kept out)<sup>10</sup>; at the turn of the twentieth century, male physicians predominantly attended births. Currently, obstetrics is an increasingly gender equal medical specialty. The Society of Obstetricians and Gynecologists of Canada reports that they had 601 female and 1485 male fellows in good standing who hold a certificate in Obstetrics and gynecology in the year 2000<sup>11</sup>. This represents a transition from 100% male practitioners in 1884 to 71% male practitioners in 2000.

## **Pain Management**

Despite tremendous advances in modern medicine, labor and childbirth continue to be painful processes. In her lesson notes for labor in January, 1906, Miss Garstang notes the “List of Drugs one ought to have with them” for a delivery<sup>8</sup>. This list includes: Antiseptics,

Chloroform, Boric Acid solutions 1-16, Ether, Digitalis, Spirit of Fiermenti, Arromatic Spirit of Ammonia, Ergot, and Acetic Acid<sup>8</sup>. While some women today choose to have natural child birth, many choose to take advantage of the pain relief options modern medicine can provide.

## Contraception

In 1892, the criminal code of Canada as cited in “The Society of Obstetricians and Gynaecologists of Canada, the First Fifty Years 1944-1994” stated :

*Everyone is guilty of an indictable offence and liable to 2 years’ imprisonment who knowingly without lawful justification or excuse offers to sell, advertise, publishes an advertisement, or has for sale or disposal any means or instructions or any medicine, drug or article intended or represented as a means of preventing conception or of causing abortion or miscarriage (p.219).*

The fact that the population in Calgary was exploding during the reign of this law is not surprising. It is equally evident that in the year 2002, when contraceptive advertisements, information and availability abound, the population growth is much more modest.

## Costs

The fifth annual report of the Calgary General Hospital dated 1995 indicates that the average daily cost per patient was 99.5 cents<sup>11</sup>. Physicians often accepted produce or livestock as payment for their services since many of the early settlers were without money<sup>4</sup>. Comparatively, the average cost total cost per day for hospital deliveries (excluding physician costs) in the Calgary Health Region was \$929.00 in the 1999/2000 fiscal year<sup>12</sup>. Today’s physicians receive \$286.11 for delivering a baby<sup>13</sup>.

## Complications

The main cause of maternal mortality in 2001 was hemorrhage. This was also the main complication of delivery in Calgary’s early years<sup>8</sup>. In Miss Garstang’s notes from 1907, the potential post-partum complications are carefully noted. One such complication is the possibility of hemorrhage. The nurses were instructed to watch for the associated signs very carefully for forty-eight hours after delivery. Her notes warn:

*There is no branch in medicine or surgery in which a nurse may be called upon to meet with emergencies as much as in obstetrics. The most important thing, but not the first which happens is a post-partum hemorrhage. This is an awful thing, it is very serious and causes the death of many women (March 15, 1907 lecture by Dr. Cooke).*

Her notes then describe how to assess the patient and caution: “Do not get frightened at the sight of blood as it is already out of the blood vessels” (March 15, 1907 lecture by Dr. Cooke).

Due to the infrequency of record keeping at the turn of the century<sup>1</sup>, it is difficult to quantify the change in maternal mortality rates, however, it is undoubtedly much lower today than in 1884.

Babies also have a better chance of survival now than they did in 1884. Modern diagnostic techniques and treatments are able to save babies at 23-24 weeks gestation whereas these babies would never have survived in Calgary’s early hospitals.

## Summary

While there have been many advances in Obstetrics over the past 100 years, many themes are surprisingly similar. The routes of exit for babies remain the same and the growth of Calgary’s population today has created bed shortages and physician shortages that also existed 100 years ago. Ethical debates on abortion are evident in the meeting minutes of the Calgary General Hospital<sup>14</sup> and these debates continue today.

However, the advances in knowledge, technology, patient teaching, and pain management have made the practice of obstetrics in Calgary in 2002 a much different specialty that it was at the turn of the century in Calgary.

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# MICHELANGELO AND THE KIDNEY

By

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## ABSTRACT

The Renaissance saw a revival of the arts and sciences, which flourished in ancient Greece and Rome. It was an era of humanism and individualism creating an atmosphere of curiosity and confidence, the perfect environment for creative minds. In medicine, the major advance included the formation of the College of Physicians, as well as a change in the attitude towards human dissections.

Michelangelo (1475-1564), sculptor and painter, lived during the Renaissance and in many ways embodies the ideas and philosophes of those times. In addition to creating some of the most timeless art the world has ever seen, he had a life-long interest in anatomy. He participated in public dissections, performed his own, and later in life aspired to illustrate Realdo Colombo's *De Re Anatomica*. Although nothing came of their collaboration, Colombo became Michelangelo's physician, and in 1549 diagnosed, and treated him for recurring nephrolithiasis.

Recently, a theory has been put forward stating that Michelangelo used the shape of the bisected right kidney in designing the mantle of the Creator in his painting of the *Separation of Land and Water*. His symbolic use of the kidney shape in a scene which represents the separation of solids (Land) and liquids (Water) suggests that the artist was familiar with the anatomy and function of the kidney. Michelangelo's preoccupation with the illness, which is evident in his poetry and drawings, may also account for his interest in the kidney. Considering the fact that Michelangelo had vast anatomical knowledge, suffered from kidney problems and became interested in their function, it is likely that he intentionally used the kidney shape in his art.

## A Glance at Renaissance

The Renaissance must have been an exciting time to live in. It began in Florence, Italy, and spans the time from the beginning of the 15<sup>th</sup> to the middle of the 16<sup>th</sup> century. Derived from the Latin word *renascere* meaning, "to be reborn," the Renaissance was a rebirth of the ideas, philosophes, art and scientific thought, which flourished in the societies of ancient Greece and Rome. However, the aim was not to duplicate the works of antiquity, but rather to equal or surpass them (Janson, 1997).

The Renaissance was a time of humanism. Importance was placed on what we still call "the humanities," namely the pursuit of learning new languages, literature, history, art and

philosophy. It was also a time of individualism, a new self-awareness and confidence. People began to question traditional beliefs and practices, a trend that became characteristic of this era (Janson, 1997).

This atmosphere of curiosity and confidence created the perfect environment in which the arts and sciences could flourish. The Renaissance witnessed a burst of creative energy leading to great achievements in every area of study. “It is a fundamental paradox that the desire to return to the classics [...] brought to the new era not the rebirth of antiquity, but the birth of a modern civilization” (Janson, 1997).

### **Medicine of the Times**

Before the Renaissance, physicians, apothecaries, and surgeons all belonged to the same guild. During this era, they split into separate groups and the physicians formed the College of Physicians. This resulted in medical practice becoming more regulated throughout Europe. For example, penalties were given to those practicing medicine without a degree and there was legislation requiring physicians to attend a course on anatomy at least once a year.

The most influential figures in medicine included Galen, Andreas Vesalius, and Realdo Colombo. Galen (129-199) lived in ancient Rome, but his ideas were still very prevalent during the Renaissance and few people dared to question them. Andreas Vesalius (1514-1564), the Chair of Anatomy and Surgery at the University of Padua, was one of the first to challenge the ideas of Galen. He published his observations and criticisms in the anatomy book *De Humani Corporis Fabrica* (Eknoyan, 1997). Realdo Colombo (1516-1559) was a student and successor of Vesalius. He is credited with making two important contributions. He observed the position of the right kidney as being lower than that on the left and was the first to correctly describe the pulmonary circulation (Coppola, 1957)(Eknoyan, 1997).

Medical practice during the Renaissance was based on the old philosophy that the human body is made up of four basic elements: earth, air, fire, and water. Illness was thought to result from a disruption of the balance between these elements and the goal of medicine was to restore it. Physicians usually based their diagnoses on a thorough examination of the body and the urine.

The study of human anatomy underwent major changes during the Renaissance. One of the contributing factors was a shift in the attitudes of the Catholic Church and the public towards human dissections. Before the Renaissance, dissection was considered a desecration of the human body, and was forbidden. Now, permission was given to dissect corpses providing that the remains were later given a proper burial (Singer, 1952). Usually not more than once a year, physicians, surgeons, and anyone interested would gather for a public dissection of criminals. By the end of the 15<sup>th</sup> century, anatomy had become an essential component of medical education (Dempster, 1943). Even the Florence Academy of Art instituted a mandatory course in anatomy for aspiring artists. It was considered important for artists to learn to draw directly from cadavers and skeletons rather than just copy illustrations (Eknoyan, 1997) (Eknoyan, 2000).

## **Michelangelo Buonarroti**

Michelangelo (1475-1564) was a sculptor and a painter who lived at the height of the Renaissance period and in many ways embodies the ideas and philosophes of those times. With the Rome Pieta (1500), which depicts Virgin Mary holding the dead Christ on her lap he established his reputation as a sculptor. Next came such timeless works as the famous David (1501-4) and the frescoes, which adorn the ceiling of the Sistine Chapel (1508-12). Some of his other works include sculptures for the tomb of Pope Julius II (1513-1516) and the Medici Chapel (1524-34). Twenty years after painting the ceiling, Michelangelo returned to the Sistine Chapel to paint the Last Judgment (1534-41) (Janson, 1997). Just a few days before his death in 1564 Michelangelo was still carving marble. In a poetic fragment he wrote: "No one has full mastery before reaching the end of his art and his life" (Vasari, 1986).

## **Art and Anatomy and the Kidney**

When looking upon Michelangelo's works, it is obvious that he had great knowledge of the human body. Actually, the artist had a lifelong interest in anatomy. As a young boy, he participated in public dissections, then learned and began to perform his own (Eknoyan, 2000). Later in life, he intended to collaborate with Realdo Colombo in the publication of an illustrated book of anatomy. Colombo's book *De Re Anatomica* was published in 1559, shortly after the author's death, without any illustrations (Eknoyan, 1997). Since Michelangelo was in the habit of destroying his drawings, it will never be known whether he made any anatomical drawings for Colombo.

During the time of their acquaintance, Colombo became Michelangelo's physician. In 1549, he diagnosed and treated the artist for recurring urolithiasis. Whether Michelangelo suffered from kidney disease before his diagnosis in 1549 cannot be established, though he frequently complained of being in "ill health" in letters to his friends and family. One such letter was written while working on the Sistine Chapel ceiling (Eknoyan, 2000). Colombo treated Michelangelo's kidney problems with unknown injections as well as a regimen of special water that had the supposed ability to dissolve urate stones. Despite the treatment, Michelangelo continued to suffer from kidney problems for the rest of his life (Eknoyan, 2000).

## **Sistine Chapel Theory**

A recent article put forth a theory stating that Michelangelo used the shape of the bisected right kidney in designing the mantle of the Creator in his painting of the *Separation of Land and Water* in the Sistine Chapel ceiling. Computer-assisted removal of God and the cherubs from the painting clearly shows the tunic in the background to be in the shape of the kidney. The figure of God emerges from what in the kidney is the renal pelvis, while the robes resemble the renal artery and vein. Even the colors used are a near-real rendering of the renal parenchyma (Eknoyan, 2000).



Taking a closer look at the fresco reveals that the mantle is not the only place where the shape of the kidney is apparent. One of the nudes surrounding the scene of the *Separation of Land and Water* is shown holding two kidney-shaped pillows, one under each arm. The facial expression of this figure, in contrast to the peaceful and thoughtful appearances of the others, seems to be expressing pain. Furthermore, the arched pose of the nude not only exposes the costo-vertebral angle where the kidneys are located, but is also typical of those experiencing kidney pain (Eknoyan, 2000).

### Artists Choice or Artistic Chance?

Whether Michelangelo made symbolic use of the kidney shape in a scene, which represents the separation of solids (land) from liquids (water) cannot be established with certainty. Could the choice have been intentional, or is it mere coincidence?

It is true that Michelangelo had a life-long interest in anatomy and was very familiar with the appearance of internal organs. He would also have been acquainted with Galen's concept of kidney function. Galen saw the kidney as an essential organ which separated solids from the serous part of the blood (Eknoyan, 2000). Michelangelo could have willfully chosen the kidney shaped background as an artistic tool to mirror and emphasize the actions of God, who is depicted separating the land, a solid, from the water, a liquid.

The artist was also preoccupied with the kidney having suffered from chronic kidney problems. It is evident from his letters and poetry, which are full of kidney associated imagery that he frequently thought about their structure and function. Therefore, it is possible that Michelangelo used the kidney shape in designing the fresco as a way of expressing an idea that was often on his mind. This interpretation is further strengthened by the fact that Michelangelo is credited with the idea that "Every painter paints himself" (Eknoyan, 2000). It means that every artist creates using images that are well known, and a part of his life. To Michelangelo, the kidney was a familiar image not only because of his extensive anatomical knowledge, but also due to his personal health problems.

Unfortunately, in the absence of clear documentation, this theory cannot be proven. There is a danger in supposing the existence of hidden meanings and interpreting works of art to support a theory. However, to deny the available evidence on these grounds is equally risky. In light of the evidence, the theory that Michelangelo intentionally used the kidney shape in painting the mantle of the Creator in the *Separation of Land and Water* is very convincing.

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# **FROM HAIRCUTTERS TO HEMOCHROMATOSIS: A HISTORY OF BLOODLETTING**

By

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## **ABSTRACT**

**In December 1779, George Washington was suffering from an inflammation of the throat, causing fever and painful swallowing. The most respected doctors in the area gathered to discuss the most appropriate treatment. On four separate occasions, their prescription was to have him bled, resulting in approximately five pints of blood being lost over two days. Washington would later die of his illness, no doubt further debilitated by his significant blood loss.**

**With its history rooted as far as the fifth century B.C., phlebotomy was born out of an effort to balance the four humours proposed by Galen. Throughout the world, it has been used to ‘cure’ coughs, headaches, abscesses and heart disease. In the fifteenth century, public baths were used and the treatment performed by the bathkeeper. In the years to follow, it became popular to have the patient stand in a basin, while up to forty cuts were applied to the legs. Leeches went from a bathing nuisance to a life-saving treatment. The most vivid images of all, however, rest with the Barber-Surgeon's Guild of western Europe, whose attempts to balance the humours lasted for over three hundred very bloody years.**

**Although there is little doubt that the history of phlebotomy has been rooted in much harm to patients, there can be many comparisons drawn to similarities in modern medical treatments. These resemblances exist in the equipment used, the effects on patient health, as well as in the theory behind treatment. A brief narration of the origins of bloodletting to some modern medical techniques shows that history often has a way of repeating itself.**

## **Introduction**

An article in 1998 by CNN told the story of Hakim Mhammad Ghyas, a modern bloodletter in New Delhi. With about one-hundred patients waiting outside his clinic each day, Ghyas remains a firm advocate in the ancient belief that venesection can cure such diseases as arthritis and cancer. His patients agree with his opinion, with one customer claiming, “After coming here I have a lot of relief from my body ache. I don’t take pills any more.”

There should be little surprise that such supporters still exist despite evidence that, with the exception of a few select diseases, phlebotomy does more harm than good. After all, despite many skeptics throughout history, bloodletting has a long history as a respected and valid therapy for a wide range of ailments. Documentations of the technique can be seen as early as the Egyptian papyri, where it was observed that a hippopotamus rubbed its leg against a sharp reed until it bled, to remove excess blood from its body. Likewise, ancient Peruvians theorized that a goat would pick a place near its diseased eye for relief (King, 1971). These early civilizations were among the first to begin treatments of bloodletting, inspired by spontaneous forms of bleeding such as nosebleeds and menstruation.

## **Hippocrates and Beyond**

Documentation of opinions regarding the practice of venesection had begun to increase by the time of Hippocrates in the 5<sup>th</sup> century BC. For example, Diogenes of Apollonia, the man credited with the first description of the vena cava, encouraged the technique, a view also shared by Hippocrates himself. In contrast, Aegimios of Eris, the author of the first treatise on the pulse, opposed bloodletting (Davis, 1979). Erasistratus (300-260 BC) was one of the earliest physicians to document his reasons behind opposing bloodletting, stating the risk of severing an artery or nerve, and the difficulty in estimating the amount of blood to be withdrawn. His belief that veins carried blood and arteries carried air created an additional fear that air could be accidentally transferred from the arteries to veins (Pendergraph, 1988).

Despite such criticisms, bloodletting had become a standard medical practice by the time of Galen (130-200 AD). Over a century earlier, Aulus Cornelius Celsus, a Roman encyclopedist, stated, “To let blood by incising a vein is no novelty; what is novel is that there would be scarcely any malady in which blood may not be let.” (Davis, 1979) To attempt to quiet any followers of Erasistratus who still remained in opposition of the procedure, Galen wrote *Against Erasistratus* and *Against the Erasistrateans Dwelling in Rome*. These books were supplemented by his *Therapeutics of Venesection*, which together presented his views on bloodletting. The theories and recommendations in these works came to be so accepted in society that they would not be effectively challenged until the seventeenth century.

## **The Humoral Theory**

Part of the strength behind Galen’s arguments in favour of bleeding came from his use of the humoral theory. The theory has its roots in the concept of the four elements proposed by Pythagoras (580-489 BC): fire, earth, air and water. Empedocles and Hippocrates would be among those who would later build this theory to include four humours: blood, phlegm, yellow bile and black bile. The humoral theory proposed that each of these components corresponded with both an essential element and a season of the year. Good health came as a result of the humors being in good balance, with an excess, or “plethora” of a humour manifesting itself as inflammation or fever. For example, winter colds were thought to be due to phlegm, summer diarrhea due to bile, and mania due to bile boiling into the brain (Mettler, 1947).

Theories on the appropriate treatment for excess humour varied, with the most common recommendations being drugs, starvation, vomiting or bloodletting. It was eventually believed by many that starvation or vomiting caused the veins to become empty of food, and therefore absorb the blood that would normally escape to the capillaries. According to this theory, food was converted to blood, and it was therefore thought that bleeding would produce the same result as food restriction (Porter, 1997). Galen recommended venesection as the preferred process, recognizing the lengthy treatment time and the great discomfort emetics and starvation caused for the patient. He also noted that venesection was more a more accurate treatment than drugs such as emetics or diuretics, whose effects could not be as readily observed (Davis, 1979).

### **The Selection of Veins**

As the popularity of venesection continued to grow, the issue of which veins to bleed came under heavy debate. Galen recommended that blood be drawn from a vessel on the same side of the body as the locus of disease. For example, he explained that blood from the right elbow be drawn to stop a nosebleed from the right nostril (Davis, 1979). Moslem medical leaders would later emphasize the concept of ‘revulsion’, or bleeding from a site as far away from the locus as possible. This theory would come to be widely accepted, with grave consequences for some who would try to oppose it. For example, in 1518 Pierre Brissot would be exiled from France for recommending bleeding near the site of inflammation, a concept named ‘derivative bleeding’. France would later pass an act through parliament to ban derivative bleeding, and it would not be until 1628 with William Harvey’s discovery of circulation that the arguments regarding bleeding site would begin to quiet.

### **When to Bleed**

Hippocrates was among the first to work out an elaborate schedule of when to bleed, based on the type and onset of disease. In China, a similar document would eventually be created in the *Inner Canon* (Porter, 1997). Although Galen would not recommend specific days, he was the first to recommend a specific volume of blood to be withdrawn: a minimum of seven ounces, to a maximum of one pound and a half (Davis, 1979). Subsequent bleeding were recommended if the first treatment did not produce the desired effect.

One of the earliest printed medical documents was the “Calendar for Bloodletting” distributed in 1457. These calendars, known as *Aderlasskalender*, became very popular in some areas of Europe, consisting of astronomical signs and a diagram of a man. By reading the influence of the signs of the zodiac and identifying the labeled body parts, an appropriate bleeding site could be found. It would eventually become law that a physician refer to the calendar before every bloodletting, becoming an action that some considered even more important than examining the patient.

By the time of the eighteenth and nineteenth centuries, many people in England were coming to the hospital in the spring and fall as part of a maintenance program for good health. During this time, the standard advice to many bloodletters was to “bleed to syncope”. In 1801

Thomas Mapleson recommended cupping, a popular form of bleeding, for the following list of diseases:

*Apoplexy, angina pectoris, asthma, spitting blood, bruises, cough, catarrh, consumption, contusion, convulsion, cramps, diseases of the hip and knee joints, deafness, delirium, dropsy, epilepsy, erysipelas, eruptions, giddiness, gout, whooping cough, hydrocephalus, headache, inflammation of the lungs, intoxication, lethargy, lunacy, lumbago, measles, numbness of the limbs, obstructions, opthalmia, pleurisy, palsy, defecative perspiration, peripneumony, rheumatism, to procure rest, sciatica, shortness of breath, sore throat, pains of the side and chest.* (Davis, 1979)

At around the same time in America, Benjamin Rush, one of the signers of the Declaration of Independence, encouraged mass bleeding during the yellow fever epidemics. He told a crowd of people in 1793, "I treat my patients successfully by bloodletting, and copious purging with calomel and jalop and I advise you, my good friends, to use the same remedies." "What?" called a voice from the crowd, "Bleed and purge everyone?" "Yes," said the doctor, "bleed and purge all Kensington." (King, 1971) Into the nineteenth century, as its utility for other diseases declined, bleeding continued to be a primary therapy for pleurisy and pneumonia. Advocates for using the procedure to treat congestive heart failure existed as late as the 1930s.

### **The Barber-Surgeons Guild**

Some of the most vivid portraits displaying the history of bloodletting come from era of the Barber-Surgeons of western Europe. In 1315, Lanfranc, an outstanding French surgeon, complained about the tendency of surgeons to leave the bloodletting to barbers and women, although this tradition would continue through the seventeenth century (Flynn, 1994). In England, King Henry VIII signed a decree to merge the two groups into the Great Company of Barbers and Surgeons. Barbershops became a location where customers could get a dental extraction, bloodletting, and a hair cut, all in a single visit. This is depicted in Rossini's famous opera, *The Barber of Seville*, where the barber Figaro sings "Largo al factotum", which translates to "Make way for the jack of all trades". Eventually, as science progressed the surgeons petitioned to split the two professions, a wish that was granted in England in 1745 and shortly thereafter in France.

The modern barber pole originated during the time when barbers were the principal bloodletters in society. Originally, the pole was the one used for during bleeding, stained red from the procedure which most commonly involved a cut at the elbow. A tourniquet would normally be applied above the vein, but when not in use it would be wrapped around the pole so that all the equipment would be together when needed. The pole with the wrapped bandages would then be placed outdoors as an advertisement of the service offered.

## Challenging Bloodletting

It was around the same time as the separation of barbers and surgeons that serious challenges against bloodletting began. Paracelsus, a German alchemist, and his Belgian counterpart Van Helmont both believed that a disproportion in the blood could be best corrected with drugs and chemicals. In the century which followed, Hippocratic medicine was revived and struck another blow against bloodletting practitioners, by emphasizing clinical observation rather than intervention. Pierre Louis would then perform a statistical investigation and find that bloodletting had no effect as a treatment for pneumonia (King, 1971). Similar criticisms would follow throughout the nineteenth century from clinical physicians, pathologists and homeopaths.

## Bloodletting Equipment

Most of the information regarding the history of phlebotomy has come from the equipment used to perform the procedure. Thorns, fish teeth and sharpened stones were among the first instruments used. Eventually, two classes of equipment emerged: those used for general bloodletting and those used for local bloodletting.

For general bloodletting, lancets, fleams and phlebotomes were the most popular. In the fifteenth century the thumb lancet was introduced, and surgeons were soon advised to carry different sizes with them to be prepared for different occasions. It was not until 1719 that the spring lancet was introduced, an instrument that would become very popular with American, German and Dutch surgeons.

For local bloodletting, leeching and cupping have been the most widely used techniques. Dry cupping involves using suction to move blood away from the inflammatory site without an incision. Alternatively, in wet cupping, suction is followed by cutting the skin to result in bleeding. Although cupping was not very popular during the medieval period, its history dates as far back as Hippocrates, who recommended cupping the breasts in order to relieve excessive menstruation (Davis, 1979). The technique had resurgence with the rise of public steam baths in the sixteenth and seventeenth centuries, where bath attendants were often responsible for performing the cupping. Some surgeons voiced their disapproval that such uneducated workers were permitted to perform the procedure. These complaints were reminiscent of earlier disapproval towards barbers performing bloodletting. For example, Thomas Mapleson stated in 1813 that:

*The custom which appears to have become prevalent of resorting to these Bagnios, or Haumaums, to be bathed and cupped, appears to have superceded the practice of this operation by the regular surgeons. Falling into the hands of mere hirelings, who practiced without knowledge, and without any other principle than one merely mercenary, the operation appears to have fallen into contempt, to have been neglected by Physicians, because patients had recourse to it without previous advice, and disparaged by regular Surgons, because, being performed by others, it diminished the profits of their profession.*

*The scarificator, a simple square or octagon with multiple blades, was introduced somewhere around 1715 and was soon adapted for wet cupping. Scarificator blades could be used up to twenty times, being cleaned and greased after each procedure by springing it into a piece of mutton fat. As the popularity of wet cupping decreased in the mid-nineteenth century, interest was lost in scarification and the effort turned to creating a more effective air-tight syringe to create suction for dry cupping. Until this time, suction had been achieved by inserting a torch into a tube for a few seconds before placing it on the patient's skin, resulting in frequent burns and uncomfortable pressure. It is interesting to note that as the popularity of dry cupping began to fall in the early twentieth century, physicians had passed on the duty of performing the technique to barbers, who would create window signs advertising "Cups for Colds" (Fido, 1996).*

### **Modern Bloodletting**

The popularity of bloodletting has seen little resurgence since its fall over the past century-and-a-half. It still remains, however, a recommended treatment for select diseases such as Hemochromatosis and polycythemia. Leeches are still used for some microsurgery techniques. The evolution of suction techniques has provided the breast pump for milk collection, and VACUTAINER for modern venipuncture. In addition, concepts surrounding the removal of blood have led to treatments such as blood transfusion and hemodialysis.

In 1875, Englishman W. Mitchell Clarke reviewed the history of bloodletting and the abrupt cessation over the past several years. His conclusion was:

*Experience must, indeed, as Hippocrates says in his first aphorism, be fallacious if we decide that a means of treatment, sanctioned by the use of between two and three thousand years, and upheld by the authority of the ablest men of past times, is finally and forever given up. This seems to me to be the most interesting and important question in connection with this subject. Is the relinquishment of bleeding final? Or shall we see by and by, or will our successors see, a resumption of the practice? This, I take it, is a very difficult question to answer; and he would be a very bold man who, after looking carefully through the history of the past, would venture to assert that bleeding will not be profitably employed any more. (Davis, 1979)*

By examining current medical techniques and modern bleeders such as New Delhi's Hakim Mhammad Ghyas, there is little doubt that the practice of bloodletting has had a profound influence on society. It is unlikely that there will ever be resurgence to the days of the Barber-Surgeon. However, it may be only a matter of time before a modern medical treatment does as much harm as that attributed to the history of bleeding.

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# **IS IT EASIER TO MAKE A CHOICE OF STETHOSCOPE IN 2002 THAN IN 1819? SOME THOUGHTS ON THE 'EVOLUTION' OF THE STETHOSCOPE**

By

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## **ABSTRACT**

**Since the emergence of the primitive wooden cylindrical stethoscope in the nineteenth century, there have been continual introductions of new stethoscopes (probably well over 100) to the present century with the aim of improving the art of auscultation. Throughout this time, strongly differing views have existed over the best stethoscope and some physicians even found that listening to the chest directly was still more effective. This paper explores the development of the stethoscope along with taking a look at some of the comparative studies of stethoscopes that have been undertaken, and finally looking towards the future of the stethoscope.**

The development of the stethoscope can be traced back to the beginning of the nineteenth century when a French physician by the name of Rene Laennec first invented the stethoscope in 1816. During Laennec's time, auscultation when undertaken, placed the physician's ear directly upon the patient's chest.<sup>1</sup> Laennec, however, found this task to be too embarrassing and he remembered from his childhood that sound could be conducted through solid surfaces. With this in mind he simply rolled three pieces of paper and created a cylinder, placing one end on the patient's chest and keeping the other end over his ear. Laennec was amazed at how well the sound was conducted and this primitive stethoscope that he had invented would become "the first noninvasive diagnostic instrument in medical history".<sup>1,2</sup>

This paper attempts to highlight some of the developments of the stethoscope, while also delving into some of the comparative studies of stethoscopes that have been undertaken, and finally looking towards the future of the stethoscope.

## **Tracing the Development of the Stethoscope: The Work of Laennec & his Successors**

Laennec replicated his device by making a wooden cylinder (approximately 30 cm long and 2 cm wide) which was composed of two pieces of hollowed wood and a third piece which consisted of a conical shaped attachment with a hollow brass cylinder inside it. This attachment could be used when auscultation of the heart was performed and removed for auscultation of the lungs. After Laennec's modification, many more 'copies' of this monaural stethoscope were introduced, although many had little to do with efficacy and more to do

with appearance.<sup>2</sup> Many materials were introduced in these modifications, which included different varieties of wood, ivory, glass, silver, pewter and brass.<sup>3</sup>

Laennec's successors introduced many technical advances of the stethoscope which included a combination percussion/auscultation, binaural, differential, phonendoscope and electronic stethoscope. These technical advances were aimed at improving the acoustic properties of the stethoscope in contrast to other technical advances which were directed towards patient comfort and physician welfare.

Of notable worth was the concern with infections in the early nineteenth century. For example, a stethoscope with an extra long length of 35 cm was introduced for use in pauper practices so that physicians could distance themselves from patients who were unclean and flea-ridden.<sup>3</sup> Similarly, in 1829, Nicholas Comins designed the first semi-flexible stethoscope which consisted of jointed wooden tubes that could be adjusted so that the physician's face did not have to be directly over the patient's face. This was of great advantage since many patients were suffering from tuberculosis at this time.<sup>5</sup> Interestingly, here we see a concern over physician welfare in contrast to the typical concern over the patient. This notion of physician welfare was seen again in the late nineteenth century when some instruments of great length were also recommended for use in prisons for the 'separation' of the physician from the prisoner.<sup>4</sup>

In contrast to the notion of physician welfare, there was an emphasis placed on patient comfort in 1889. During this year, James Murray introduced the rubber ring which could be fitted onto the bell-end of the stethoscope which he claimed would fit better to the chest wall and would be warmer for the patient.<sup>4</sup>

In 1828, Pierre Piorry made the first advance in the design of the stethoscope which now consisted of only two parts and also consisted of a pleximeter and an ivory headed chest-piece.<sup>4</sup> Here, we see the combination of percussion and auscultation in one instrument. Perhaps, this was impractical, however, as percussion was not in widespread use during this time and the stethoscope was introduced for the purpose of auscultation.

One of the major milestones in the development of the stethoscope was the attempt to produce a binaural stethoscope. Although Nicholas Comins had suggested employing both ears in auscultation, he never made an instrument of such sort.<sup>5</sup> As early as 1829, Charles Williams and John Forbes made efforts towards constructing a binaural stethoscope, but were limited by the lack of satisfactory rubber and their stethoscope consisted of lead pipes without proper ear pieces, making it difficult to apply.<sup>4</sup> The introduction of rubber in the 1950's made it easier to make an improved model of the binaural stethoscope.<sup>3</sup> George Camman received credit for inventing the binaural stethoscope in 1851, and he published his account of it in 1855.<sup>4</sup> In 1856, James Pollock introduced Camman's model to Great Britain and described it as "a very perfect instrument, which conducts the chest sounds to both ears at once and excludes all ordinary external sounds"<sup>1</sup> The instrument consisted of woven tubing, a wooden bell-shaped chest piece, ivory ear pieces and a broad rubber band to hold the ear pieces in place.<sup>2, 4</sup>

Despite Camman's introduction of the binaural stethoscope, the monaural stethoscope was still widely used, and as late as 1910 was still being used outside the United States. In fact, the binaural stethoscope was not used in England until the 1880's.<sup>4</sup> The use of the binaural stethoscope in the United States, however, could be attributed to Austin Flint who was an advocate of this stethoscope and was often called the "American Laennec".<sup>5</sup>

In 1859, Scott Allison introduced the differential stethoscope which was subsequently used to compare the sound intensity coming from two areas of the chest. However, this design did not prove to be beneficial.<sup>2,5</sup>

Bianchi introduced the phonendoscope in 1894, which was intended to magnify sounds. It was hoped that it would be beneficial in localizing organs, and it could be used not only for auscultation of the heart and lungs but also for the ear, eye, bladder, stomach and vagina. The phonendoscope, however, did not become widely used. During this same year, R.C.M Bowles patented the modern form of the diaphragmatic chest-piece. This was another ingenious invention along the course of the stethoscope's development.<sup>4,5</sup>

Interesting to note was the invention of the 'versatile stethoscope' in 1884 by Aydon Smith. This instrument could be used as a monaural, a binaural, or a differential stethoscope and the tubing could be used as a catheter or a stomach tube while the chest piece could be used as an ear speculum or percussion hammer. This was perhaps one of the most unique stethoscopes that had ever been introduced.<sup>4,5</sup> Another unique invention included stethoscopes designed to fit into a jacket pocket by taking advantage of the ball and socket joint so that they could be folded.<sup>4</sup>

Throughout the twentieth century the stethoscope became an integral part of medicine. The beginning of this century was marked by the introduction of the electronic stethoscope which could be used to make records of heart sounds and murmurs and also for teaching purposes.<sup>5</sup> There continued to be modifications of pre-existing designs as well as introductions of new designs, some of which were considered impractical while others proving to be useful. However, the invention of the binaural stethoscope in the 1850's has left its mark in history, as this ingenious invention is more or less the modern day form that is used today.<sup>4</sup> Current and recent developments of the stethoscope are focused on obtaining the best acoustic properties of this binaural form.

### **Comparative Studies of Stethoscopes**

How does one determine which stethoscope to choose? Is it any easier to choose a stethoscope in 2002 than in 1816? It seems that over the course of the past two centuries the same dilemma still exists over stethoscope preference. "The choice of a stethoscope is largely irrational. The newly fledged medical student is either likely to follow his professor's choice or buy the latest slim-line model. However, it would seem that an instrument which is an extension of the clinician's sensory system should be chosen on some rational basis".<sup>6</sup> In fact, the selection of a stethoscope is often based upon the exterior features (vanity) or upon the suggestion of mentors, peers and the company selling the stethoscope rather than the acoustic properties of the stethoscope.<sup>8</sup> A plausible reason for this may be because there is

no standard means by which to assess the acoustical performance of stethoscopes. This therefore limits the acoustic evaluation of commercial stethoscopes and thus determining the 'superior stethoscope'.<sup>7</sup> Surprisingly, over the last four decades there have been very few studies (in English) comparing the acoustic properties of commercial stethoscopes.<sup>8</sup>

In 1967, a comparison of some newer stethoscope models was made with more older and cheaper models. From the results of this study, a few general principles were deduced. It was found that the size of the area of the stethoscope piece in contact with the chest had no direct relationship with the amount of sound collected. In comparing stethoscopes with similar tubing and dimensions, diaphragms that had enclosed a greater skin area did not always have a superior performance than those that enclosed a smaller skin area. Other principles were that a good stethoscope requires both a bell and diaphragm, and that a stethoscope should have a small internal volume for superior performance.<sup>6</sup>

One particular study which was published in 1982, chose to compare the acoustical performance of stethoscopes using a combination of tests. The researchers felt that simply comparing the output response to pure frequency tones may not relate to bedside performance. Therefore, the researchers tested the acoustic properties of the stethoscopes using taped heart sounds and actual patient recordings in addition to the pure frequency tones. It was found, however, that the response to pure frequency tones could reasonably predict the clinical performance of a particular stethoscope model. Other findings included an advantage of the bell chest piece over the diaphragm for low-pitched sounds, the lack of superiority of the diaphragm over the bell chest piece for high-pitched sounds, and no advantage of double tube stethoscopes over single tube stethoscopes.<sup>7</sup>

In 1992, a comparison of the acoustic properties of six popular stethoscopes was published in the Journal of the Acoustical Society of America. The stethoscopes used in this study were the Littmann Classic II, Littmann Cardiology II, Littmann Master Cardiology, Hewlett-Packard Rappaport-Sprague, Tycos Harvey Triple Head, and Allen Medical Series 5A RPS Binaural. This study used a sound frequency generator and an active artificial ear and both the diaphragms and bells were tested. They found that sounds in the low frequency range were generally amplified by the bells and attenuated by the diaphragms, however no significant differences were found between the six stethoscopes. Sounds in the high frequency range were generally attenuated by both the bells and the diaphragms, although the bells generally produced less attenuation than the diaphragms. It was found, however, that the Tycos Harvey Triple Head ribbed diaphragm attenuated sound transmission to a greater degree than the other diaphragms. It was concluded from this study that the differences in sound transmission between the six stethoscopes was small, however the Littmann Cardiology II, bell and diaphragm were considered to have the best overall performance.<sup>8</sup>

More recently, a clinical comparison between acoustic and electronic stethoscopes was undertaken and published in 1998. These are the two different types of stethoscopes that are currently available on the market. The main advantage of the acoustic stethoscopes are their ergonomic design, however they attenuate sound transmission proportionate to frequency. Therefore, the electronic stethoscope has been designed to overcome this frequency limitation with a more uniform frequency response. The electronic stethoscope, however,

also has limitations which include the sensitivity to manipulation and electronic noises, a bad ergonomic design, and a lack of bell and diaphragm filtering. In addition, the electronic stethoscope does not take into consideration the sensitivity of the human ear which varies with frequency. Therefore, the acoustic stethoscope still remains more widely used despite the introductions of more sophisticated electronic stethoscopes. The aim of this clinical study was to identify the best acoustic and electronic stethoscopes with the goal of designing a new electronic stethoscope that combined the advantages of both types of stethoscopes. This 'ideal electronic stethoscope' would have adjustable amplification, no electronic noise or sensitivity of manipulation, adjustable tubing length, bell and diaphragm filtering, and a highly ergonomic design.<sup>9</sup>

### **The Future of the Stethoscope**

What is the future of the stethoscope? Will the use of this instrument be pushed aside by technological trends and advances? The stethoscope has become an invaluable bedside tool since Laennec's discovery almost two centuries ago. It is used for diagnosing heart-valve diseases, fluid in the lungs, and acute bowel problems along with the auscultation of numerous other sounds in the body. However, there has been concern that the use of this invaluable instrument among the medical professionals has been declining, with more emphasis being placed on technologies, drugs and therapies. For example, a heart specialist may turn to a cardiac ultrasound to diagnose a heart murmur instead of having to rely on his or her own ears through a stethoscope. Research indicates that during the past twenty years the use of cardiac ultrasound has indeed decreased the reliance on the stethoscope to the point where physicians simply do not feel comfortable making specific diagnoses with it. In fact, a similar event took place in the early 1900's when chest x-rays pushed aside the use of the stethoscope. However, physicians learned that the combined use of the stethoscope and chest x-ray would lead to superior diagnosis than either alone. Looking towards the future, however, the stethoscope may be "making a comeback" as the health care dollar is trying to be maximized. In fact, money that is being spent on cardiac ultrasounds may be used for abnormal findings instead of routine use and the money saved can be used for health education and new therapies.<sup>10</sup>

Perhaps the electronic stethoscope will be the most 'popular' stethoscope of the future, as it is capable of magnifying heart sounds to a much greater degree than that of the acoustic stethoscope. It is possible that the design barriers of this model and the higher cost may be overcome and the electronic stethoscope may become widely accepted, as did Laennec's discovery almost 200 years ago when it replaced direct auscultation of the chest.

### **Conclusion**

In terms of whether it is easier to make a choice of stethoscope in 2002 than in 1819, a look back into the early nineteenth century showed the introduction of a wide array of stethoscopes that could have been used for auscultation, if it was even undertaken. Hence, it was not easy to choose a stethoscope during this time due to the continual introduction of new stethoscopes which meant that there was no accepted stethoscope model that was being widely used. A look at the twenty-first century, however, shows the use of the binaural

stethoscope as an accepted standard in auscultation. However, there are numerous acoustic stethoscopes currently on the market and new stethoscopes being introduced to the market with no standard means to assess the acoustical performance of these stethoscopes. Therefore, when choosing a stethoscope, there are no standards by which one can follow. As well, the use of electronic stethoscopes is also in widespread use, lending to another issue over choice of acoustic versus electronic forms of the stethoscope. Therefore, one can say that it is still not easier to choose a stethoscope in 2002. This opens the door for questioning whether or not there can ever be a standard means by which to assess the acoustical properties of the stethoscope.

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# **ANALYZING CHANGES IN TRADITIONAL ACUPUNCTURE IN THE WEST: A CASE STUDY IN VANCOUVER, BRITISH COLUMBIA**

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## **ABSTRACT**

**When surveying the history of medicine, few practices have the antiquity of acupuncture. In fact, it is commonly accepted that Chinese acupuncture dates back to the Stone Age. However, as in any medical discipline, time has brought change and acupuncture is no exception to this rule. With the resurgence of Traditional Chinese Medicine (TCM) in China, coupled with an increased demand for treatment in North America, acupuncture is ripe for change. Traditional Chinese Medicine and acupuncture have been practiced in Vancouver for at least three decades yet little has been studied about the process and the extent to which acupuncture has evolved in it's transplanted setting. In particular, the effects of western biomedical theory and patient demand as forces of change had not been defined. This study set out to examine changes that have occurred in acupuncture, as practiced by TCM practitioners in the west. This was accomplished through oral histories from TCM practitioners that focused on changes in technique, communication, theory and trends in patient demographics. It was found that many practitioners have modified their physical technique, using less stimulation, thinner needles and tube insertion. Impetus for such change was most often due to patients low pain tolerance. Traditional techniques such as moxibustion have been abandoned because of fire regulations that prohibit the practice and western patient's aversion to smoke. Moreover, practitioners have adapted to Canadian patients' expectation of privacy, relaxation and holistic history taking. Traditional Chinese Acupuncture is indeed evolving in the west, providing a rich contemporary history.**

## **Introduction**

There exists in western health care a propensity to be reductionist in our view of complementary and alternative therapy. Those modalities considered "natural" or "traditional" are put under this banner and assumed to be static; they possess the cumulative wisdom of thousands of years of ancient tradition. Little consideration is given to the possibility that "traditional" practices evolve and change within a given cultural and historical framework. Traditional Chinese Medicine (TCM), including acupuncture, has been practiced in Vancouver outside the Chinese community for at least three decades. Despite this longstanding relationship with western culture, little has been studied about the process and the extent to which acupuncture is shaped by its transplantation or the forces of change that shape its evolution.

Possible “Canadianization” of acupuncture has been debated in other works dealing with integration of alternative therapies. In “Alternative Health Care in Canada” (Crellin et al. 1997), the question was posed, “to what extent are ethnic medical practices shaped by their transplantation? When a complex of ideas is carried from one society to another, it may well change to fit the new social/cultural setting.” Indeed, Traditional Chinese Medicine must co-exist in the west with the widely accepted biomedical model. It must also compete in an “alternative” patient-funded milieu against a publicly funded, scientifically endorsed system. This paper will examine the extent to which traditional acupuncture has evolved in Vancouver, British Columbia and the relevance of factors such as patient demand and the western biomedical model as agents of change.

### **The Journey to the West**

The first major compilation of Chinese medicine occurred in the third or second century B.C.E. The book was created by Huang-ti, or the “Yellow Emperor”, who called the work “The Yellow Emperor’s Classic of Internal Medicine” (Crozier 1968). This cannon made Chinese medicine more readily accessible to those wanting to learn healing philosophy and technique. Jesuit missionaries returning from China reported the use of needles for medical therapy and coined the term “acupuncture” from the Latin *acus* (needle) and *punctura* (pricking) (Eisenberg et al. 1993). Canada’s own Sir William Osler wrote in the Principles and Practices of Medicine in 1909 that acupuncture was the most efficient treatment for lumbago, and he had personal experience with its use. He went so far as to state that in many cases the relief was immediate and extraordinary (Fernandez 1972). President Nixon’s trip to China in 1972 served to popularize acupuncture in the United States. After a New York Times reporter covering the presidential visit was treated with acupuncture for postoperative complications of an appendectomy, the medical community and the lay population alike became interested in this mysterious metaphysical healing art (Lee and Liao 1990).

It is difficult to know when acupuncture was first practiced in British Columbia. Chinese male immigrants were brought to Canada in large numbers to work on the railroad during the 1870’s. During this time government immigration policies prohibited or made it financially impossible, for working men to sponsor their families into Canada. Thus the family unit, so crucial to Chinese culture, was broken (Con 1982). Chinese medicine too was victim of protectionist policies, this time at the hands of the College of Physicians and Surgeons. It was commonplace during the 1970’s and 1980’s for TCM practitioners to receive threatening letters or even be charged criminally for practicing medicine without a license- that is, for practicing acupuncture. Suspicion was high and people mostly practiced underground only taking on trusted clientele:

*“Practitioners were very suspicious in those days. I wanted to set up practice with someone after I returned from training in China... I took my Chinese diplomas and went to the secret TCM practices I had learned about from friends. When they would open the door just a crack I would shove my diploma in but when they saw my [white] face they would always close the door.”*

TCM and acupuncture have come a long way from the clandestine practices of the 1970’s. British Columbia is the first province to regulate Traditional Chinese Medicine Practitioners. The College



of Traditional Chinese Medicine Practitioners and Acupuncturists of British Columbia (CTCMA) is an official body established in 2000 by the Government of British Columbia, to regulate the practice of Traditional Chinese Medicine (TCM). The College is a self-regulatory body that operates under the auspices of the British Columbia Provincial Government through the Health Professions Act and the Traditional Chinese Medicine Practitioners and Acupuncturists Regulation and Bylaws. The mission of the CTCMA is to protect the public by establishing a system of mandatory registration in which practitioners have to meet the standards of TCM and acupuncture care established by the College ([www.ctcma.bc.ca](http://www.ctcma.bc.ca)). There are now over 800 registered traditional acupuncturists in the B.C., and while not yet universally accepted, at least there can be no question as to the legality of traditional acupuncture.

## **Methods**

In order to assess changes that have occurred in acupuncture, oral histories were completed with 19 acupuncturists in the greater Vancouver area. Interviews ranged from 45 min to 120 min in duration. Informants were chosen based on his or her routine use of traditional TCM diagnosis, at least ten years practice experience in the west as well as membership in the College of Traditional Chinese Medicine Practitioners and Acupuncturists of British Columbia (CTCMA).

Of the 50 acupuncturists contacted from the public directory published by the CTCMA, 20 did not meet the inclusion criteria, 5 declined on the basis of communication difficulties in English, and 6 said they were too busy to do an interview. The remaining 19 were interviewed and included in this study.

## **Results**

The majority of those interviewed (11) received predominantly eastern training while four acupuncturists received western TCM training and four received both eastern and western training. Seventeen of the 19 acupuncturists interviewed had predominantly Caucasian clientele. Patients tended to be female, 30-50 years of age, middle class or higher. Ten to 20 years ago these patients generally tried acupuncture for chronic illness or musculoskeletal pain. According to most practitioners, public expectation is changing as acupuncture becomes increasingly accepted and patients are now seeking acupuncture at a younger age, in earlier stages of illness and for more complex internal conditions.

In contrast to patients in China, Canadian patients expect privacy, relaxation and holistic history taking. Many acupuncturists have also modified their physical technique, using less stimulation, thinner needles, tube insertion and have abandoned some traditional techniques such as moxibustion.

## **Changing Presentations in Acupuncture**

By all accounts, patient demand is changing as acupuncture achieves an elevated level of acceptance and integration into western health care. It was surprising to find that the overwhelming majority of acupuncture practitioners interviewed had predominantly Caucasian clientele. Even more surprising was the realization that this is not an emerging trend but, in fact, the way things have been for decades. Although the ethnic make-up of patients has changed little during the past three decades,

the circumstances under which they are seeking treatment are changing. Patients are now seeking acupuncture at a younger age and for more complex, internal conditions. In the past, patients tried acupuncture as a “last resort” for conditions such as arthritis, fibromyalgia, M.S., and chronic pain syndromes. With these chronic illnesses, for which Western Medicine has little to offer, acupuncture was often the last beacon of hope. Today acupuncturists are treating conditions formerly thought to be squarely in the domain of conventional medicine such as cancer, infertility, gastrointestinal conditions and asthma. One acupuncturist said, “In the past people thought only minor illness could be treated. Now patients realize that serious illness can be treated.” According to those interviewed, a growing number of patients are looking to acupuncturists to treat acute conditions before they seek advice from conventional doctors. Another area of growing interest is what several practitioners referred to as “lifestyle illnesses”. Traditional acupuncturists are treating more depression, addictions, and obesity. On the one hand this is undoubtedly a result of excessive western living but one must also consider the increased emphasis on health promotion and balance in TCM as a catalyst for individuals to seek treatment.

In the context of conditions treatable by *anatomical acupuncture* (acupuncture based on anatomical points rather than energy meridians), several traditional practitioners referred to muscular pain and arthritis as “simple conditions” that could benefit from biomedical acupuncture. Ironically, these “simple” conditions are the same cases that comprised the narrow practice domain of the acupuncturist in decades past. Regardless of the complexity of the disease or treatment, in the past the practitioners' clinical repertoires were limited in comparison to the training they had received. The effects of such a narrowing of clinical practice are unclear.

Acupuncturists attribute the changes in presenting illness to an increased acceptance of eastern medicine in general, and especially acupuncture. “People believe in acupuncture more today” said one practitioner, “and when they believe, they are more committed to treatment”. Growing acceptance has stemmed both from individual results and scientific endorsement of acupuncture. In fact, most acupuncturists do not advertise but rely on word of mouth to attract patients. Another strong force in swaying popular opinion has been the World Health Organization’s endorsement of acupuncture as a safe and effective treatment. In 1997 The National Institute of Health in the United States published a consensus panel report recommending acupuncture as a useful clinical procedure. Although there is not yet scientific consensus as to the mechanism or therapeutic indications for acupuncture, practitioners of TCM acknowledge that scientific proof can be a determinant in patients' choice of treatment.

## **Evolving Technique**

The treatment that patients receive is also changing within the traditional acupuncture milieu. 15 of the 19 traditional acupuncturists interviewed said they have reduced the size of the needle gauge since they have practiced in the west. Most acupuncturists still use a range of needle sizes, with the average being 0.22 mm. Fourteen acupuncturists have also reduced the amount of stimulation and the depth of insertion. The most frequently cited reason for these modifications was western patients' low tolerance of the pain of needling. While everyone agreed that the modified technique is still a beneficial treatment, not all practitioners were convinced that it as effective:

*“The first time I practiced acupuncture on a Caucasian person I was doing a demonstration in front of many people. I did it my usual way I learned in China. The man [patient] did not say anything at the time but he told me later that his hand hurt for days after the treatment! Then I realized I must be careful. At first I thought that such weak stimulation must be placebo, but now I believe that patients can get good results from reduced stimulation...I still think deeper is a better treatment.”*

The ancient practice of moxibustion has been practically abandoned in practices in Vancouver. Moxibustion treats and prevents diseases by applying heat to points on certain locations of the body. The material used is mainly "moxa-wool" in the form of a cone or stick, which is burned. For centuries, moxibustion and acupuncture have been used together in clinical practice, and they are usually termed together in Chinese. The book *Miraculous Pivot* (a section of *The Yellow Emperor's Classic of Internal Medicine*) states, "A disease that may not be treated by acupuncture may be treated by moxibustion" and "When a disease fails to respond to medication and acupuncture, moxibustion is suggested." (Crozier 1968). Today, because fire regulations in most buildings prohibit such practices and patients dislike the smoke involved, practitioners do not use this treatment.

### **Public vs. Private: Making the Transition**

Those who have practiced in China, have found it difficult to adapt to the constraints of a private system where you generally see patients only once or twice each week. In China patients come to the publicly funded hospital for treatment every day until health and balance is restored. "Here, patients can't afford to come every day" and according to practitioners, this makes treating the patient a more difficult and lengthy process. The difference between the public system in China and the private, complementary nature of practice here in Canada has forced adaptation in other areas of practice as well. Relaxation and personal attention are high priorities for most Canadian clients. In contrast to China where as many as 20 patients receive treatment together, Canadian patients demand privacy. In some cases acupuncturists stay with one patient an hour long session thus seeing fewer people.

When traditional acupuncturists were asked if they find it necessary to educate patients about the philosophy behind acupuncture there was no clear consensus. Several practitioners flatly stated that patients were not interested. Others felt that only TCM explanations should be given while still others felt it was necessary to combine western and eastern explanations of treatment. Those who combined biomedical thinking and TCM to communicate diagnosis and treatment tended to be those individuals who had studied in China in a University setting. The training in these institutions over the last 20 years has been a combination of western biomedical teaching and Traditional Chinese Medicine, providing an excellent foundation for the integration of these two paradigms. In a study looking at Chinese Medicine users in the United States it was found that respondents reported enjoying a close relationship with their Chinese medicine practitioner, learning new things, and feeling more able to guide their own lives and care for themselves. While these factors mesh well with Chinese medicine theory, respondents did not reveal familiarity with that theory. Instead, their language and experiences indicate familiarity with a holistic model of healthcare (Cassidy, 1998). Thus, patients seek to integrate TCM into a holistic framework rather than immerse themselves into

Traditional Chinese treatment. Such “sharing” of patients is still a relatively new concept within most medical modalities and as such will require investigation to assess the most beneficial combinations of therapy.

When asked about the most significant differences between practicing in China and Vancouver, the majority of Chinese trained acupuncturists stated that it was the lack of institutional and professional support in private practice. Curiously, only three of the 19 acupuncturists interviewed were in a combined practice. This may be related to a culture of fear and suspicion created in the 1970’s and 1980’s when acupuncturists were routinely charged for practicing medicine without a license. In fact, every acupuncturist interviewed who had practiced in Vancouver during the 1970’s related a personal story of a telephone threat or investigation against him or her. As the practice of acupuncture is regulated it will be interesting to see if this trend of individual practice reverses.

## Conclusion

It was found that due to patient demand and the complementary nature of TCM in the West, traditional acupuncture has undergone significant change during the last 30 years. Both cultural forces and the dominant view of the biomedical model in the west have also contributed as forces of change. Adaptations involve changes in communication, treatment choice and technique. These changes were particularly pertinent for those who had practiced in China. The effects of adaptations on efficacy are unclear but worthy of further investigation. Although ancient, acupuncture is an evolving medical art and the coming years will continue to bring change as acupuncture continues to carve a niche in Western healthcare of the 21<sup>st</sup> century.

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# FEVER THERAPY IN THE TREATMENT OF SYPHILIS

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## ABSTRACT

**Syphilis is one of the most fascinating diseases of humans. Its history dates back to the late fifteenth century in Europe, and it remains a menace to society today.**

**Currently, we understand syphilis as a sexually-transmitted disease (STD) caused by the spirochete, *Treponema pallidum*, that is treatable with a course of penicillin. However, it is the history behind this modern-day therapy that is intriguing. The earliest treatments of syphilis consisted of mercury, arsenphenamines, or a combination of these poisons. It was seen that in spite of the beneficial effects of these toxins on early and secondary syphilis, they had very little beneficial effect on the tertiary stage of the disease that affects the nervous system and the brain. In 1917, Julius Wagner-Jauregg, a Viennese psychiatrist introduced and developed “fever therapy”. He inoculated the malarial parasite, *Plasmodium vivax*, into patients suffering from dementia paralytica in tertiary syphilis. He found that the patients developed malaria with a high fever, which seemed to halt the relentless course of the syphilis. Once the syphilis was treated, the malaria was terminated with quinine. This led to many other interesting methods of producing artificial fevers: hot baths, hot air, diathermy, radiothermy and electric blankets, in hopes of providing a cure for syphilis.**

*“Know syphilis in all its manifestations and relations,  
and all other things clinical will be added unto you.”*

-Sir William Osler, 1897

Syphilis is one of the most fascinating diseases of humans. It can manifest in many different forms and can affect almost anyone. The origin of syphilis is controversial and probably will never be resolved. There are three main theories that have been developed. The first theory proposes that syphilis existed in Europe even before Columbus returned from the Americas. Evidence for this pre-Columbian existence of syphilis has been examined mainly through literature searches for descriptions of the disease and by examining pre-Columbian bones for gross changes characteristic of syphilis. Interestingly, there is also striking evidence of the existence of pre-Columbian syphilitic bones in the Americas, which leads to the other two theories. The Columbian theory states that when Columbus returned from America in 1493, he also brought back syphilis with him. The disease was acquired from the natives in the West Indies and was carried back to a non-immune population in Europe. At this time in

Europe, the continent was engaged in wars, providing the perfect conditions for disease transmission because the movement of troops and camp followers created the ideal vehicle for the rapid spread of this disease and the epidemic in the late fifteenth and early sixteenth centuries. The other theory is the Environmental theory, which proposes that when syphilis first appeared in Europe, it was due to a spontaneous mutation of other treponemal diseases common in the rest of the world. Amusingly, everywhere that syphilis appeared, it was regarded as new and the names for it would attempt to shift the responsibility for it to others. For example, “the Italians called it the Spanish or French disease; the French called it the Italian or Neopolitan disease; the English called it the French disease; the Russians called it the Polish disease; the Turks called it the French disease...”. Nevertheless, syphilis was problematic in the past and continues to trouble society today.

The great epidemic led to much interest in the subject of syphilis. In fact, the medical circles were preoccupied with trying to understand the clinical characteristics of the disease. In 1530, Girolamo Fracastoro published a poem entitled “Syphilis, sive Morbus Gallicus,” translated as “Syphilis, or the French Disease”. In this poem, the name of this dreaded venereal disease is an altered form of the name of the hero Syphilus, a shepherd who is supposed to have been the first victim of the disease. Thus, it was recognized from the beginning that sexual intercourse was the main form of transmission, although poor hygiene made extragenital transmission relatively common.

Syphilis is a disease with many presentations. Primary syphilis occurs approximately three to four weeks after infection. Initially, a painless uncreative lesion, known as a chancre, may be noticed at the site of entry of the spirochete bacterium. These chancres can occur anywhere on the body, for example, there are penile chancres, vulvular chancres, perianal chancres, chin chancres, labial chancres, and tongue chancres. Thus, sometimes, the diagnosis of this sexually transmitted disease may be missed. At this stage in the disease, the patient may also notice some regional lymphadenopathy. The second stage of syphilis occurs several weeks to six months after the chancre heals. This stage has many more distinguishing signs and symptoms such as: a papulosquamous rash (especially on the palms of the hands and soles of the feet), mucous membrane lesions, condyloma lata (syphilitic wart), alopecia, arthralgia, syphilitic meningitis with cranial nerve palsies, iritis with anterior uveitis, constitutional symptoms (fever, malaise, sore throat), as well as generalized lymphadenopathy. The third stage of syphilis occurs in approximately one-third of patients who have untreated syphilis. This stage can present as cardiovascular syphilis, gummatous or benign late syphilis, or as neurosyphilis. The clinical presentation of neurosyphilis is very variable. The patient may have tabes dorsalis, in which there are lightning pains, papillary abnormalities, ataxia, lower extremity reflex abnormalities, and incontinence. Or, the patient may have asymptomatic neurosyphilis, gummatous neurosyphilis, or meningovascular neurosyphilis. Lastly, the patient may present with general paresis of the insane in which there is dementia with slurred speech, papillary abnormalities, reflex abnormalities, tremors, and seizures.

Even when syphilis first presented itself in Europe, it was clear that a “cure” must be found. Thus, the medicine men often tried an amazing gamut of treatments, including infusions of holy wood, blood letting, application of hen’s dung on the lesions, and other concoctions

either singly or in combination with each other. From 1493 to 1905, the treatment for syphilis, as was for all other diseases, was completely empirical. Through all these experiments, only mercury showed any success in treating the disease, as it seemed to be successful in healing the chancres. Paracelsus was given credit for this form of treatment, but many other independent healers must have also tried mercury treatment, since it was commonly used for the treatment of skin disorders. Not only were all different things used to try to find a cure for this disease, but all different forms of application were also used. For example, there were ointments, pills, plaster, and also inhalation of vapors. In fact, the extensive, uncontrolled use of mercury led to many toxic side effects that were just considered as part of the tertiary stage of the disease process! In 1836, William Wallace revolutionized the treatment of syphilis when he introduced potassium iodide as part of the treatment. He concocted a “syphilitic cocktail” which consisted of biniodide of mercury, potassium iodide, and syrup of sassailla. The exact action of the iodides was not completely understood, but it was thought that they might have acted by dissolving the waxy covering of the syphilitic organism, therefore, allowing the body’s antibodies to destroy it. It is quite evident that as the first four hundred years of syphilitic history came to a close, very little new knowledge had developed.

In 1905, Schaudinn and Hoffmann discovered that syphilis was caused by *Treponema pallidum*, a spirochete (spiral bacterium). This event changed the approach to the treatment of syphilis. In 1910, Paul Ehrlich discovers Salvarsan (compound 606). This was an arsphenamine (i.e. made from arsenic) and it was found that the spirochete disappeared from the primary lesions about twenty-four hours after injection. Furthermore, secondary eruptions disappeared after several days. Unfortunately, it was soon evident that these arsenicals were not completely effective in the treatment of syphilis; thus, combined arsenical therapy gained popularity. For example, the arsenicals were often mixed with other metals such as mercury or bismuth to enhance their effects. In spite of the beneficial effects of arsphenamines and heavy metals on early and secondary syphilis, it could be seen that they had little or no beneficial effect on the tertiary stages of the disease. This led to the introduction of “fever therapy” in the treatment of tertiary syphilis by the Viennese psychiatrist Wagner-Jauregg in 1917.

Artificial fever therapy dates back to Hippocrates’ era and was associated with treatment of syphilis as early as 1659. Wagner-Jauregg’s own work grew as a continuation of this tradition. Wagner-Jauregg began experimenting with artificially induced fever in his patients in the late 1880s. He originally began by treating various psychoses with erysipelas to induce fever, but these experiments failed miserably, and he did not publish the results. He went on to experiment with tuberculin and also a mixture of tuberculin and iodine-mercury and finally, malaria. On June 14, 1917, Wagner-Jauregg inoculated nine patients with general paresis of the insane, a common manifestation of neurosyphilis, with blood taken from a patient with malaria caused by the organism *Plasmodium vivax*. He reported that “six of the nine cases showed extensive remission” and in three of these patients, the remission proved to be permanent.

It was found that a minimum of forty hours of high fever (103-106°F) was required for malariotherapy to be effective. The mechanism of action of fever therapy was not

completely agreed upon, but two theories were proposed. The first theory is that fever increases the permeability of the small vessels of the brain, which increases cytokine levels and permits the cytokines to reach the diseased brain tissues. The second theory is that fever affects the heat sensitivity of *T. pallidum* i.e. a temperature of 41°C for an hour and a half was enough to kill the spirochetes. The termination of the malarial infection was accomplished with quinine. The general conclusion was that malariotherapy was the “most valuable method of treatment” for neurosyphilis leading to a higher number of remissions, fewer deaths, and clear evidence of improvement.

Unfortunately, there were some drawbacks to this form of therapy. Some of the side effects are: liver damage, ruptured spleen, jaundice, severe hallucinations/delirium, uncontrolled vomiting, and persistent headaches. Furthermore, malariotherapy is expensive and also requires hospitalization and attentive medical care. This led to research into artificial fever therapy many new inventions. There was the Kettering hypertherm fever cabinet, hot baths, diathermy, radiothermy, electric blankets, infrared/carbon filament light cabinets, and protein shock. Fever therapy of any kind was not a very pleasant experience. One patient’s account of this experience was, “For one small pleasure I suffer a thousand misfortunes, I exchange one winter for two miserable summers, I sweat all over my body and my jaw trembles, I do not believe I will ever see the end of my troubles.”

In 1927, Wagner-Jauregg was awarded the Nobel Prize for his work with malariotherapy, but this award was quite controversial. There were many ethical concerns with Wagner-Jauregg’s work because he was injecting one deadly disease to “kill” another. From 1932-72, the US public health conducted an experiment, called the Tuskegee Study, on 399 African-American men in Alabama who were in advanced stages of syphilis in order to study the ravages of the disease during the autopsies after their deaths. They were only told that they had “bad blood” and were often given fake, painful treatment. Even when penicillin was discovered in 1943, it was withheld. In 1972, the Washington Star broke the story to the public and it wasn’t until 1997 that President Clinton formally apologized to these patients and their families on behalf of the United States government.

In Alberta between 1924-50, malariotherapy was adopted as a major treatment option for neurosyphilis. During this time, patients with tertiary syphilis with neurological manifestations were sent to the Ponoka mental institution. At one point in time, nearly half of the patients at the hospital had neurosyphilis. These patients were subjected to malariotherapy and the methods and results of these trials are now located at the Provincial museum in Edmonton.

Although artificial fever therapy and particularly malariotherapy are fascinating treatment options for tertiary syphilis, it is still questionable as to whether malariotherapy was truly efficacious in the treatment of neurosyphilis. This is because at the time that fever therapy was introduced, there was a wish to believe that this was the cure for the “incurable” disease. In addition, inadequate research methods, such as non-randomized controlled trials and non-uniform follow-up periods, were used so the results gathered from these experiments were neither reliable nor valid.



In 1943, Dr. Alexander Fleming discovered penicillin, which revolutionized the treatment of bacterial diseases, including syphilis. A declining trend in the incidence and prevalence of syphilis was seen until just recently. Unfortunately, there are an increasing number of cases of syphilis each year. There have been recent outbreaks in Vancouver, San Francisco, and even Calgary. This increase is most likely due to the current social factors and evolving sexual practices. Today, we treat the primary and secondary stages of syphilis with Benzathine penicillin and we use Penicillin G4 for tertiary syphilis, including neurosyphilis. Both of these drug treatments are very effective and will be relied upon in trying to keep this disease under control.

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# **RADIOTHERAPY OF BRAIN TUMORS 105 YEARS OF SEARCHING FOR THE CURE 1897-2002**

By

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## **ABSTRACT**

**Is the next advancement in radiotherapy going to cure brain tumors? This question, still asked today, echoes back several generations to the early 1900s. In the past, attempts at radiation treatment of brain tumors have been dotted by periods of great hope for advancement, only to fizzle into marginal improvements over previous methods. Today, the standard treatment for most common brain tumors consists of 5000 to 6000 rads of high-energy electron beam radiotherapy, given in fractions of up to 200 rads per day, 5 days a week, with no treatment on weekends. This peculiar regimen has its origins in ram sterilization experiments in the 1920s and 30s. By delivering smaller fractional doses over several days, the skin of the scrotum could be spared from a severe dose-limiting reaction, allowing a larger total dose to be given and successfully achieving sterilization. Prior to this, radiation treatment of human brain tumors often consisted of delivering large doses, much like a one-time surgical procedure. Radiation did not penetrate well into tumors deep within the skull, and skin damage was the main factor that limited treatment dosages. If there were some way to deliver more radiation to the tumor and spare the scalp from a severe burn, then cure rates surely would improve. Just such a breakthrough occurred with the invention of powerful 250 kilovolt transformers in the 1950s, enabling the delivery of massive doses as high as 10,000 to 15,000 rads. However, this innovation did not herald a major cure. Since then, many advancements in technology and technique have in turn raised hopes of finding effective treatments, but yielded only modest improvements in overall cure rates. Currently, there are many exciting possibilities in development. Are we on the verge of a breakthrough, or is history about to repeat itself?**

Radiotherapy, or the use of x-rays (roentgen rays) for the therapeutic treatment of cancer, has been with us now for over 100 years. Breakthroughs in theoretical physics have led to breakthroughs in technology and equipment. Many obstacles that stood in the way of effective treatments have been conquered. However, cure rates for brain tumors are still far too low. Over the last century, we have witnessed a recurring pattern of heightened hopes for a cure which have never been fully realized. Today, many exciting new treatment options are on the horizon. Will these new treatments significantly increase survival, or is history about to repeat itself?

Brain tumors, or primary intracranial neoplasms of the central nervous system (see Table 1), were recognized at autopsy long before attempts were made to treat them with radiotherapy<sup>(1)</sup>. In the days before radiation therapy, treatments for brain tumors were attempted with varying success. In fact, one of the earliest successful surgical removals of a brain tumor took place at the Glasgow Royal Infirmary in 1879, nearly 20 years before the discovery of x-rays<sup>(2)</sup>.

**Table 1: Various kinds of primary tumors found in the intracranial cavity**

Table 1-A: as described in pathology textbook, 1897<sup>(1)</sup>

Gliomata (tumors of neuroglia)  
 Ganglionic Neuroglioma (tumors of neuronal origin)  
 Gliosarcoma (tumors of adventitial sheaths of cns vessels)  
 Sarcomata (tumors of connective tissue)  
 Angiomata (vascular malformations, not cancer)

**Table 1-B: as recognized today<sup>(3)</sup>**

Gliomas (tumors of Neuroglia)  
     Astrocytoma  
     Glioblastoma  
     Ependymoma  
     Oligodendroglioma

Tumors of Neuronal Origin  
     Neuroblastoma  
     Ganglioneuroma

Tumors of Embryonic/Primitive Cell Origin  
     Medulloblastoma  
     Primitive Neuroectodermal Tumor  
     Pineoblastoma

Other Primary Tumors  
     Choroid Plexus Papilloma  
     Meningioma  
     Hemangioblastoma (mesenchymal origin)  
     Germinoma (germ cell origin)  
     Teratoma (germ cell origin)  
     Craniopharyngioma (developmental)

Radiotherapy, now synonymous with radiation oncology, had its genesis shortly after the discovery of x-rays by Wilhelm von Röntgen in 1895<sup>(4)</sup>. In 1897 in Vienna, Professor Leopold Freund demonstrated that a benign hairy nevus or mole could be made to disappear with the use of x-rays<sup>(5)</sup>. Professor Freund intentionally irradiated the mole after it was

observed that x-ray workers were accidentally losing their hair through the effects of radiation <sup>(6)</sup>.

Shortly thereafter, in 1899, x-rays were demonstrated to be effective in curing a form of skin cancer called Basal Cell Carcinoma <sup>(2)</sup> such as seen in Figure 1. This dramatic initial response, along with other initial successes brought an unrealistic hope that the discovery of radiotherapy had yielded a miraculous new cure for the scourge of cancer <sup>(7)</sup>.

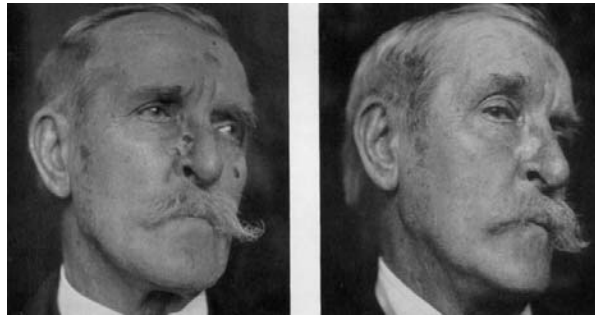


Figure 1: Basal Cell Carcinoma ("Rodent Ulcer") on side of nose cured by radiotherapy circa 1918 <sup>(8)</sup>

At the same time, it was evident that surgery was ineffective in curing most forms of brain cancer (which comprise some of the most aggressive and lethal forms of cancer known to affect humankind). Thus, since x-rays had proven effective for superficial carcinomas (neoplasms of epithelial origin), attempts were made to treat many other forms of cancer, including brain tumors (see Figure 2) <sup>(9)</sup>.

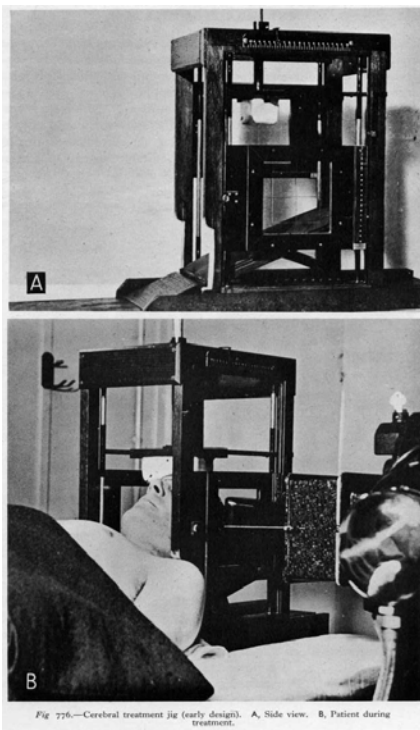


Figure 2: Early treatment jig for brain tumor irradiation. A, side view. B, patient during treatment <sup>(9)</sup>

However, the early stages of radiotherapy were fraught with difficulties. The first 25 years have been referred to as the “dark ages” of the discipline <sup>(7)</sup>. Dangers beyond dermatitis and telangiectasis were not well recognized. There were no training programs for radiation therapists, who were often surgeons performing radiotherapy as a sideline <sup>(10)</sup>. Most treatment plans were created by trial and error based on the radiotherapist’s own personal experience on his own particular set of equipment <sup>(6)</sup>. There were no such things as automatic or electric timer switches. Doses were given while the radiotherapist measured time on his hand-held pocket watch <sup>(8)</sup>. Filters and shielding were either inadequate or non-existent, causing much unnecessary exposure to both radiotherapists and patients.

Science was still in its infancy about the nature of radiation and atomic theory. There was no comprehension of the biological effects of radiation, and no reliable method to measure the dose. In fact, it wasn’t until 1908 when a dosage unit based upon x-ray ionization in air was proposed by Villard <sup>(4)</sup>.

In those early years, equipment was primitive, and the usual technique consisted of a single massive exposure to attempt to eradicate the tumor in a single treatment as if it were a surgical procedure (see Figures 3 and 4). As a result, morbidity and mortality was high, and major complications developed in patients that survived <sup>(7)</sup>.

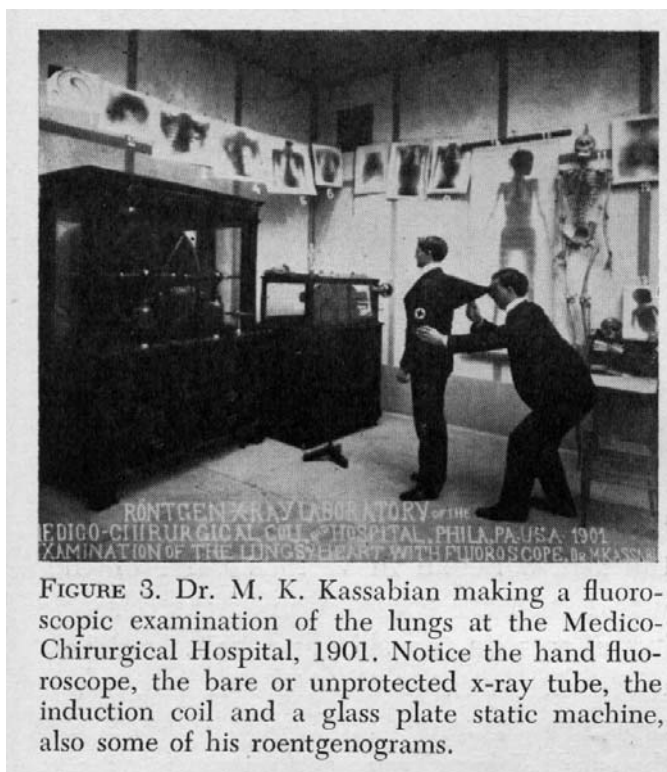


FIGURE 3. Dr. M. K. Kassabian making a fluoroscopic examination of the lungs at the Medico-Chirurgical Hospital, 1901. Notice the hand fluoroscope, the bare or unprotected x-ray tube, the induction coil and a glass plate static machine, also some of his roentgenograms.

Figure 3: Primitive equipment used in diagnostic x-ray procedures circa 1901 <sup>(4)</sup>



Figure 4: Early radiation treatment consisted of a massive dose of radiation to attempt to eradicate the tumor in a single procedure <sup>(8)</sup>.

A technological breakthrough occurred in 1913 when William Coolidge invented the x-ray tube <sup>(4)</sup>, which transformed energy from x-rays into electromagnetic radiation. By varying the temperature of a tungsten filament contained within the tube, the electromagnetic current could be controlled. This was significant because it allowed the stable operation of diagnostic and therapeutic x-ray devices. In fact, this was such a monumental achievement that nearly all x-ray tubes in use today are a variation on Coolidge's design <sup>(7)</sup>.

The implantation of radium sources into tumor beds, known as brachytherapy, also began during this time period <sup>(7)</sup>.

Science had not yet established why radiation was effective against neoplasms. The basic biologic interactions of radiation, including cellular response, systemic response and late effects, were unknown. In spite of this, it was recommended that all gliomata (neoplasms arising from the interstitial tissue or neuroglia of the brain, see Figure 5) be subjected to as intense roentgen treatment as possible, since the outcome could not be predicted in any particular case. Similar presenting cases sometimes had very different outcomes with the same treatment regimen <sup>(11)</sup>.

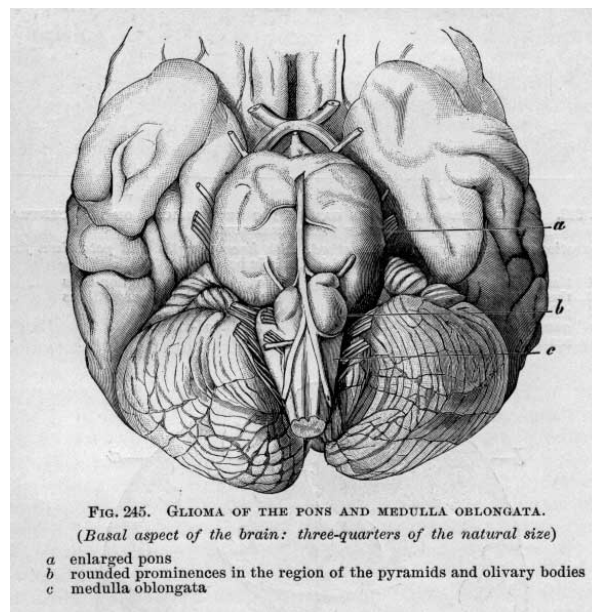


Figure 5: Example of a Glioma: artist's reconstruction, gross anatomy of a Glioma of the Pons and Medulla Oblongata, 1897 <sup>(1)</sup>

Measurement of the quantity of ionizing radiation was complex and difficult which led to problems with standardization. A skin-unit dose was not available until 1920 when one was introduced by Seitz and Wintz <sup>(4)</sup>. Incidentally, this was the same year that the Bohr model of atoms was proposed. Rutherford's pioneering nuclear experiment where nitrogen gas was transformed into an isotope of oxygen took place only one year prior <sup>(4)</sup>. New theories were just being developed to explain the nature of the atom and nuclear physics. Treatment of disease by radiation proceeded notwithstanding.

The lack of standardization made it difficult to compare x-ray treatments from one centre to another, let alone within the same centre. A 1937 paper entitled “Effect of Roentgenotherapy on Gliomas” reflected this with a disclaimer that irradiation techniques had varied considerably, even though they were all treated at the same location. This was due in part to differences in dosage unit measurements, differences in filters used, and in part to early voltage limitations of equipment which was later upgraded<sup>(12)</sup>.

One of the earliest improvements in radiotherapy was the discovery of fractionation. With fractionation, radiotherapy is administered in a series of fractions of the total dose, usually once a day for several weeks, in order to minimize damage to normal tissue. This important discovery remains the basis for most radiotherapy treatments given to this day.

Using normal tissue with a high mitotic index as a model for cancer, Regaud and Ferroux performed experiments in Paris, France in the 1920s and 1930s in an attempt to deliver radiation to a target while minimizing damage to normal tissue. In these experiments, the testes of rams were irradiated with x-rays. It was known that if attempts were made to sterilize the animals in a single dose, a severe reaction to the skin of the scrotum would develop. However, Regaud and Ferroux discovered that if the dose was fractionated over a period of time, sterilization could be achieved with little apparent skin damage<sup>(6)</sup>. With this evidence, fractionation was introduced into clinical practise for all cancer treatments, including brain tumors.

However, much higher energy radiation was needed to effectively penetrate the skull than the 200 kV roentgen rays that were available during those years. Much of the radiation acted on the surface. Skin damage was thus still the limiting factor in the irradiation of brain tumors. Tarlov defined the “threshold skin dose” in the treatment of gliomas in 1937 as the quantity of radiation that produced a visible skin pigmentation in 80 percent of patients within one month<sup>(12)</sup>.

It wasn't until the late 1930s when the effect of radiotherapy on gliomas, the most common lethal form of primary brain cancer, was described<sup>(13)</sup>. With standards not yet established, variation between prescribed dosages were huge. For example, initial doses ranged from 1600 rads (radiation absorbed dose – a measurement of energy absorbed per unit mass) up to 9500 rads. To put this in perspective, the total dose to gliomas now is usually between 5000 and 6000 rads, and a routine chest x-ray delivers approximately 0.015 rads (15 millirads) to the chest.

Some patients were re-irradiated upon recurrence, which is no longer done today due to late toxic effects. Some patients did poorly, and length of survival was not related to dosage. As well, survival was not influenced by the temporal sequence of irradiation. For example, a single series of radiotherapy versus three smaller series spread out over three months was compared - in either case, the mean survival was 11 months<sup>(12,13)</sup>. Sachs concluded in his 1936 paper that larger doses of roentgen radiation should be used, and proposed various ways to try to accomplish this<sup>(14)</sup>.

Even as late as 1945, the primary factor limiting the irradiation of brain tumors was still the scalp and vascular structure of the scalp. Some therapists in agreement with Sachs, advocated tumor doses as high as 10,000 to 15,000 rads<sup>(15)</sup>. Since then, evidence has accumulated that normal adult brain, brainstem and spinal cord can be damaged by doses much lower than this. The TD<sub>50</sub> (toxic dose for 50% of patients) for the irradiation of brain tissue using 180 to 200 rad fractions is 5000 to 5400 rads. Radiation necrosis occurs in 1% to 5% of patients after a total dose of 5500 to 6000 rads. Above this range, the likelihood of necrosis of the normal brain parenchyma increases significantly<sup>(15)</sup>.

Further technological advances in the 1950's led to advances in the treatment of brain tumors. The invention of more powerful transformers and rectifiers capable of producing electric potentials of 200-250 kilovolts led to the invention of machines emitting high-energy photons<sup>(7)</sup>. Radiation from these machines was more powerful and more deeply penetrating than previous x-ray sources.

Even with this advancement, radiation therapy had not become the first line of defense against brain cancer. In his large multi-volume compendium on cancer treatment, Raven wrote in 1958 that, "the ideal treatment for intracranial tumors is excision" <sup>(16)</sup>. Certain types of tumors, such as cerebellar medulloblastoma, were thought to be more radiosensitive and thus more amenable to treatment by radiotherapy. However, most malignant tumors were found to recur despite all the best efforts of surgery and radiotherapy. Although some people at the time questioned the futility of treating gliomas which would ultimately come back, radiotherapy did bring an extension and improvement in the quality of life to patients, and there was no reasonable alternative <sup>(16)</sup>.

The effect of irradiation on tumors of the central nervous system showed much disparity. It was difficult to predict what the outcome would be. This variation was thought to be due to differences in the biological basis of the tumors. Pack wrote in 1959 that gliomas, whether irradiated or not, could show considerable variation in survival period, with remissions and exacerbations. Also, patients were generally improved following surgery; therefore, the effects of post-operative irradiation could not be properly evaluated. In addition, the histologic alterations induced by irradiation were not yet definitely established<sup>(13)</sup>.

Treatment results were inconclusive, and it was not known why treatment failed in the majority of cases of brain tumors: Pack also wrote in 1959 that "it remains to be determined whether our present radiation technics are at fault, or whether the majority of these growths are resistant to radiotherapy"<sup>(13)</sup>.

A decade later, a Canadian invention, the Cobalt 60 Cancer Therapy Unit (nicknamed the "Cobalt Bomb") was developed with the assistance of Atomic Energy of Canada Ltd.'s Commercial Products Division. First used in Ontario in 1951, it gave the radiotherapist a further effective tool for the treatment of intracranial neoplasms. This device emitted higher-energy gamma rays, which allowed deeper penetration of radiation doses, and a greater absorbed dose<sup>(7)</sup>.



Further improvements were always being sought after. For example, a device called the gamma helmet was invented by physicists in Sweden to improve upon the Cobalt Bomb and deliver precise doses of radiation to brain tumors<sup>(2)</sup>.

The aim in treating brain tumors is to maximize the radiation dose to tumor cells, and limit it elsewhere. Disagreement ensued between practitioners who believed in whole-brain irradiation to kill invisible neoplastic cells (“seeds”) outside the main tumor bed versus those who advocated partial-field irradiation to limit exposure to normal tissue.

In the late 1960s and early 1970s, linear accelerators came into use. These machines accelerate electrons to a very high energy, between 5 and 40 million electron-volts (MeV), which is far more powerful than the best kilovolt technology available twenty years earlier. The radiation produced by these megavolt machines was even more penetrating than the gamma rays of the cobalt bomb, allowing a high-energy beam that gave a much greater depth of dose.

With the improvement of equipment, and supervoltage doses, improvements were seen in the 5-year survival rates. The approximate 5-year survival for brain tumor patients treated with radiotherapy between 1950 and 1955 was 20%, whereas between 1970 and 1975 it had improved to 30%<sup>(7)</sup>, where it currently remains. Maximum therapeutic dosages now occurred at deep tissue levels, so skin damage was no longer the dose-limiting factor in brain tumor irradiation.

In fact, late radiation damage effects became dose limiting. With higher doses and more profound tissue penetration, other central nervous system disturbances became apparent, such as early effects like demyelination syndrome, somnolence syndrome, headache, vomiting and drowsiness related to increased intracranial pressure. Late effects included radiation necrosis of the brain, progressive blood brain barrier breakdown, progressive demyelination and glial atrophy<sup>(5)</sup>, giving rise to progressive neurological deficits in the part of the brain that was irradiated. This occurred as early as 3 months and as late as 5 years after treatment<sup>(6)</sup>.

Although the use of supervoltage machines resulted in a slight increase in the 5-year survival of brain tumor patients, it was still only around 30% (aggregate for all intracranial neoplasms)<sup>(7)</sup>. Something else was needed to increase the effectiveness of radiotherapy. Many new methods and techniques were attempted.

Widespread clinical trials were undertaken to investigate a promising technique called hyperfractionation, where smaller radiation doses are given more frequently (usually either two or three times a day, rather than the usual regimen of once a day, five days per week). The hope was that smaller individual fractions would allow a larger total dose to be safely delivered without an increase in undesirable side effects to normal brain tissue. Unfortunately, results were inconclusive, and there was no clear improvement in patient survival. In fact, in one study, results were worse, suggesting that the individual fractions were too small to have enough toxic effect on the tumor cells<sup>(5)</sup>.

Attempts were made to improve the effectiveness of radiation treatments in the 1980s, none of which really proved to be successful because of either toxicity or lack of effect <sup>(17)</sup>. In some cases these treatments are still being investigated. Several past attempts to improve results are listed in Table 2.

**Table 2: Some techniques and methods used in the past to improve results of radiotherapy**

Neutron treatment (higher energy particles)
Radiosensitizers
Superfractionation/hyperfractionation
Hyperbaric oxygenation
Hypoxic cell sensitizer (Metronidazole) combined with photon radiation
Various combinations of radiotherapy with chemotherapy
Boron neutron capture therapy
Increasing radiochemical lesions
Inhibition of repair
Brachytherapy
Radioprotection of normal tissues

A more recent advancement in brain tumor treatment is called Stereotactic Radiosurgery, which is not surgery in the conventional sense. In fact, no cutting is involved. With stereotactic radiosurgery, multiple narrow beams of radiation are directed toward a common point in order to produce highly localized dose to a deep-seated area, sparing the normal tissue around it. This method relies heavily on three-dimensional computer imaging to focus up to 200 beams on the tumor. There are two common approaches to delivering stereotactic radiosurgery: one uses a linear accelerator, and the other, called the Gamma Knife, uses gamma-radiation from cobalt-60 sources.

In 1997, there were more than 150 radiosurgery facilities in North America. It was estimated that by then, a total of 22,000 patients worldwide, approximately 10% of whom were children<sup>(18)</sup>, had undergone treatment for a wide variety of benign and malignant intracranial disorders using radiosurgery. In Canada, fractionated stereotactic radiosurgery is currently available in both Montreal and Toronto. The first Gamma Knife center in Canada is planned for the fall of 2003 in Winnipeg, Manitoba<sup>(19)</sup>.

Currently in 2002, the preferred treatment for brain tumors is still surgical excision to as complete an extent as possible while preserving neurological function. With some types of tumors, surgery is combined with or followed by radiotherapy<sup>(20)</sup>. If excision is not possible, radiotherapy is the next most effective treatment option. It is still more effective than any chemotherapeutic treatment for neoplasms of the central nervous system. Radiotherapy is also useful for palliative treatment, and for the treatment of recurrences in patients initially treated with surgery alone.

Radiation therapy continues to be an active area of research, supported by government funding <sup>(21)</sup>. While non-radiation modalities are being investigated, such as gene therapy,

hyperthermia or local chemotherapy placed directly on the tumor during surgery (see Table 3), new methods for improving the effectiveness of radiotherapy are also actively being sought<sup>(21)</sup>, some of which are listed in Table 4.

**Table 3: Non-radiation investigational treatments for brain tumors**

Gene therapy  
 Direct delivery of chemotherapy to the brain tissue (eg. Gliadel wafers)  
 Blood Brain Barrier disruptors (enhance access to the tumor bed)  
 Intrathecal infusion of chemotherapy  
 Immunotherapy  
 Hyperthermia  
 Targeted Exotoxin therapy  
 Angiogenesis inhibitors  
 Differentiating agents  
 Anti-cancer vaccines  
 High-field interventional MRI with neurosurgery

**Table 4: Investigational treatments involving radiation**

Conformal radiotherapy  
 Radioimmunotherapy  
 Cyclotron  
 Drugs to enhance radiation effect (radioprotectors, radiosensitizers, radioenhancers)  
 Boron Neutron Capture Therapy  
 Direct delivery of chemotherapy to tumor bed via balloon catheter  
 Improvement in treatment planning algorithms

In summation, in over 100 years, many significant improvements in technology and equipment have been achieved to treat brain tumors more effectively with radiotherapy. It is quite conceivable that this trend will continue. For example, less expensive linear accelerators and improved algorithms could make stereotactic radiosurgery more readily available. However, cure rates presently remain far too low.

Improvements in delivering radiation more precisely will not cure brain tumors. It may reduce toxicity to normal brain tissue, but the problem with the nature of brain cancer will not change. Secondary tumor deposits can form several centimeters away from the main tumor mass<sup>(20)</sup>, so tumor seeds that are distant from the primary site would be missed.

While research is ongoing to improve radiotherapy, it should be kept in mind that other innovative treatment modalities (such as gene therapy or differentiation agents) may some

day be more effective at treating brain tumors, and perhaps radiotherapy will be used as an adjuvant to maximize effect.

Research must continue until a curative therapy is found. Radiotherapy may or may not have a role in the distant future, but for now, radiotherapy is often the best tool we've got.

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# **KENNEDY AND ADDISON'S DISEASE: DID AN ILLNESS SHAPE A PRESIDENCY?**

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## **ABSTRACT**

**Throughout his political life, John F. Kennedy was plagued by health problems that were both an open secret and a contentious issue. The possible effects of the illness and its treatment are only coming to light years after his death.**

**As a child, Kennedy suffered from a variety of illnesses that forced him to be separated from his family and peers at crucial times in his development. So ill he was given last rites four times, he was eventually diagnosed as having Addison's disease and placed on cortisone, a steroid whose psychiatric side effects were later discovered.**

**Although frailty forced him into confinement, he was also made to conform within a family of highly competitive and active members. He developed a taste for solitary pursuits, becoming the "bookish" Kennedy and authoring an influential work while he was in a deep depression and hospitalized for a back injury.**

**This paper explores the questions of how Kennedy's illness might have contributed to his character, the effects treatment possibly had on his functioning, and the influence between physiology and personality, a field that is only now gaining recognition.**

Throughout his political life, John F. Kennedy was plagued by health problems that were both an open secret and a contentious issue. The possible effects of the illness and its treatment are only coming to light years after his death.

As a child Kennedy suffered from a variety of illnesses that forced him to be separated from his family and peers at crucial times in his development. Born sickly and with feeding problems (Hamilton 1992, 33; Hersh 1997, 14), at two years of age he was hospitalized with scarlet fever. After surviving, he was sent to a sanitarium for three months. At four, he only attended ten weeks of a thirty-week kindergarten term due to illness. At thirteen he was diagnosed with appendicitis and chronic gastro-intestinal distress, for which his physicians couldn't discover the cause. As a student in prep school he was diagnosed as having leukemia and hepatitis (Hersh 1997, 15). While there a knee skinned from playing tennis almost turned into fatal blood poisoning (Perret 2001, 37). Shortly after entering Princeton he

withdrew due to jaundice or hepatitis (Lasky 1963, 72). All of these illnesses seemed to be severe and cyclical in nature, yet they would resolve as mysteriously and as dramatically as they appeared. To this day some biographers refer to Kennedy's illnesses as largely "psychosomatic" (Clinch 1973, 108) or due to "depression" (Perret 2001, 35), literally interpreting his orthopedic problems as symbolically telling his family to "get off of his back" (Clinch 1973, 108). The biological cause of his baffling ailments only came to light when he was thirty years old.

While on a trip to the British Isles, J.F.K. once again fell ill, becoming feverish and vomiting. In London he was rushed to the London Clinic where Sir Daniel Davis diagnosed him as having Addison's disease. It was 1947, and oral cortisone wasn't available until four years later. Kennedy became a guinea pig for the new treatment and every two months cortisone pellets were implanted in his thighs and lower back (Perret 2001, 147). Later he was treated with both oral and implanted cortisone.

Although frailty forced him into confinement, he was also made to conform within a family of highly competitive and active members. He developed a taste for solitary pursuits, becoming the "bookish" Kennedy. His best-selling *Why England Slept* was based on his undergraduate honours thesis from Harvard and foreshadowed later literary success.

1954 was a year of crisis for Kennedy. Hoping to alleviate his constant back pain, in October he opted to have a double fusion of the spinal discs to correct the procedure he had had in 1944. He had been wearing a back brace and using crutches between public appearances, but those closest to him noted his increasing pain and depression. Warned about the risks of the operation considering his adrenal insufficiency, he was given Last Rites. After the procedure, he developed anemia and a *staphylococcus* infection, which made another operation to remove the plate necessary, and he again received Last Rites. The operations didn't help his back. Desperate, he consulted Dr. Janet Travell, a New York physician who specialized in pain management. She determined that Kennedy's back problem was exacerbated by his left leg being three-quarters of an inch shorter than his right, which had been undetected by his previous doctors. With her influence, he recovered and returned to Washington in May of 1955. The experience is attributed to maturing Kennedy. During convalescence he wrote *Profiles in Courage*, a best seller that won the Pulitzer Prize in History in 1957.

Kennedy's Addison's disease was a major focus of his life, and complicated the medical and psychiatric pictures. What did cause J.F.K.'s endocrine disorder? Was it a genetic predisposition, exposure to a biological toxin, or a toxic early environment?

Attachment theorists draw a link between adult illness and childhood attachment (Maunder and Hunter 2001), claiming that secure attachment to stable objects in early childhood is related to better health as an adult. Unhealthy object relations has also been implicated in unsafe sexual practices (Bassman 1991). Clearly Kennedy did not feel his was a stable environment. When faced with one of his mother's frequent trips away from home the five year old Jack announced "Gee, you're a great mother to go away and leave your children all alone" (Perret 2001, 24). He never did feel close to his mother according to biographers: she never visited him at boarding school, despite his repeated requests, and she rarely wrote him

(Perret 2001, 26; 35). According to Kennedy himself she never hugged him: he was an infant during the reign of L. Emmett Holt, a prominent pediatrician who warned against open displays of affection towards children, citing the risks of communicable diseases (Perret 2001, 19).

Joseph Kennedy Sr. was well aware of his son's health, both physical and emotional. When one of Jack's adolescent pranks resulted in a confrontation between the Dean of his prep school, his father, and Jack, Kennedy Sr. admitted to the chief physician at the Mayo Clinic, Dr. O'Leary, that he was worried about Jack having "a much more serious breakdown than a physical one" (Hamilton 1992, 128).

How much of Kennedy's sexual acting out was caused by faulty attachment to his mother or by his father's example is unknown: Joseph Sr. even brought one of his mistresses, Gloria Swanson, with the Kennedy family on a trip to Europe (Clinch 1973, 32) and had no qualms about visitors to the family household knowing his proclivities, lewdly and loudly entertaining his teenage caddy while Rose Kennedy, Lyndon and Lady Bird Johnson, a Senator and aide, visited downstairs (Hersh 1997, 27). Although the extent of J.F.K.'s extramarital sex life has been a matter of public conjecture, what is known is that he had been treated for many years for a recurrent venereal disease, the record of which was moved from the National Library of Medicine in Washington to the Kennedy Library in 1983 (Hersh 1997, 233). Which was the greatest influence on J.F.K.'s behaviour - example, early environment, or biology - is unknown, but common threads run through the Kennedy family.

Kennedy Sr. also suffered from "great nervous tension, ulcers and neuritis" (Clinch 1973, 40). He was widely reported as being extremely competitive and ruthless, advising his children if they "can't be captain, don't play" (Clinch 1973, 20) and that power was the only motive to command (Clinch 1973, 42). Competition was encouraged in the family, with mother Rose stating that the often fierce rivalry (Clinch 1973, 73; Hamilton 1992, 46) between Joseph Jr., and Jack "was very good, as it is for any children" (Clinch 1973, 45). Jack had a slightly different take on the situation, claiming that his elder brother had a "pugnacious personality" that "was a problem in my boyhood" (Clinch 1973, 71). After a childish prank resulted in his expulsion from school, Jack underwent psychological evaluation by Dr. Prescott Lecky. The famed psychologist concluded that Jack was "definitely in a trap psychologically speaking" and that "a good deal of his trouble is due to comparison with an older brother" (Hamilton 1992, 130). Of the Kennedys, Jack said, "We soon learned that competition in the family was a kind of dry run for the outside world" (Lasky 1963, 69).

Considering some of the widely-documented behaviours of several generations of Kennedys, is what has been called the "Kennedy neurosis" (Clinch 1973) or the "Kennedy schizophrenia" (Hamilton 1992, 790) really a genetic predisposition towards Antisocial Personality Disorder? Both Joseph Sr. and Jr. were widely noted for their aggression and bullying (Hamilton 1992, 46); Ted and Robert for problems controlling their tempers, and all of the Kennedy sons for their womanizing (Clinch 1973, 72). Most of the Kennedy women have managed to evade the same notoriety, although several Secret Service men accuse three Kennedy women of unwanted and aggressive sexual advances (Hersh 1997, 244). Many of

the family traits (Clinch 1973, 372; 373), which allowed them to acquire their status bear more than a passing resemblance to Anti-Social Personality Disorder, or sociopathy (O'Connor 2001).

Several studies cite low cortisol and low serotonin as being correlated with aggression, violence, and Anti-social Personality Disorder (Dolan 2001; Buydens-Branchey et al. 2000; Pajer 2001; Susman 1999; McBurnett 2000). Human and animal studies also indicate that hypocortisolemia is related to Post Traumatic Stress Syndrome (PTSD), and has genetic and environmental components (King, Abend, and Edwards 2001). Could a genetic predisposition towards PTSD during childhood and later depersonalization due to prednisone explain Jack's apparent emotional detachment (Hamilton 1992, 204; Clinch 1973, 117; 119), which he had throughout life (Clinch 1973, 118)? Norman Mailer commented on Jack's "elusive detachment to everything he did. One did not have the feeling of a man present in the room with all his weight and all of his mind" (Clinch 1973, 119); Gore Vidal also noted the President's "ironic detachment about himself and others" (Clinch 1973, 225). Was this a personality trait within "normal limits," a result of Addison's disease, or a side effect caused by its treatment?

Endocrine conditions such as Addison's are highly variable in expression. Addison's can be sporadic (Greenspan and Strewler 1997, 763) and some forms of the disease are highly heritable: the probability of a sibling of an Addison's patient having the disease or a related endocrinopathy is 0.35 (Greenspan and Strewler 1997, 763). In fact Jack's sister Eunice was also diagnosed with Addison's (Perret 2001, 147). As recently as 2001, both cases were attributed to a viral infection (Perret 2001, 147). However, there are many other known causes of hypocortisolemia, some of them genetic, including Familial Glucocorticoid Deficiency (Greenspan and Strewler 1997, 336). Adrenogenital Syndrome is another cause of low cortisol levels, highly variable, and probably more common than suspected, especially milder variants that involve partially functioning enzymes (Friedlander 2001).

Although Kennedy claimed that his "idiopathic Addison's" probably came about after exposure to malaria (Taylor 1975) he had many indications of Addison's disease (Greenspan and Strewler 1997, 336; 337) from early childhood, including recurrent gastro-intestinal complaints, infections, fevers, weight-loss and attentional problems. His well-documented behaviours and health problems are certainly consistent with androgen excess.

It is difficult to draw a direct cause and effect relationship between hormones and behaviour, but that Kennedy was treated with cortisone was a published fact. In 1960 he admitted that he had been on the medication for a "partial adrenal insufficiency" (Lasky 1963, 376). Could this medication have influenced his psychiatric functioning, and did it?

Reckart and Eisendrath (1990) found that although the psychiatric side-effects of glucocorticoid treatment are common, patients are unlikely to report them to their physicians because of "embarrassment or fear of being labeled insane." The reported prevalence of steroid psychosis in patients treated with glucocorticoids ranges from 1.8% to 57%, although there is no relationship between dose and severity, onset or type of steroid psychosis. Serious psychiatric side effects have been reported with doses as low as 20 mg per day (Wolkowitz et



al., 1997). Hall and others (1979) concluded that patients who received more than 40 mg of prednisone per day were at highest risk of developing psychosis. Psychiatric side effects of glucocorticoids include initial euphoria, emotional lability, impairment in memory and cognitive functioning (Greenspan and Strewler 1997, 329), and hypomania, including increased sexual arousal (Wolkowitz et al., 1990; Hersh 1997, 232 ). Adrenal insufficiency itself can also change the libido (Greenspan and Strewler 1997, 29). Did Addison's and its treatment influence J.F.K.'s Presidency?

Many claim that the Kennedy White House started the era of style over substance in politics. J.F.K. acquired a cult following, largely because of the careful manipulation of his image and the vitality he projected. Adlai Stevenson suggested that Kennedy's "all-American boy" appearance would make an "effective contrast on television to Richard Nixon's dark, heavy looks" (Lasky 1963, 174). He was careful to maintain a tan, which gave him a "glowing look," aided considerably by the side effects of the Addison's disease (Perret 2001, 147; Hamilton 1992, 144; 360). Called the "most videogenic personality" of the time (Lasky 1963, 174), he was self-conscious about the fuller face the medication gave him (Taylor 1975). Greeting people while campaigning bruised his hands (Taylor 1975). Bruising is a known side effect of the medication. Many also noted his hyperactivity (Clinch 1973, 147) and nervous habits (Clinch 1973, 119). Was this hypomania, induced by his medication? He was emotionally labile, baffling interviewers by being "delightfully amusing, the next minute grave and serious" (Clinch 1973, 147). Because it was a more conservative era, public figures were protected from full media exposure. The press apparently glossed over many of J.F.K.'s idiosyncrasies, although in the *Pathology of Leadership*, Dr. L'Etang claimed that there were "certain inconsistencies of (Jack's) behavior that have not been admitted, investigated or explained" (Clinch 1973, 259).

Although the Kennedys were astute about image management, they were far more lax privately, apparently believing that social privilege would buy discretion: before the White House years Kennedy had already formed a questionable relationship with Inga Arvad, a woman who had ties to the Nazi Party (Perret 2001, 96-99). Once he acquired the Presidency, Kennedy often entertained women without the Secret Service knowing their particulars, even during politically unstable times (Hersh 1997, 245; 246).

Several Secret Service agents worried that the President would end up being blackmailed through his sexual addiction (Hersh 1997, 106) a weak spot during the Cold War (Hersh 1997, 243). The impact this would have had on his career and world history was never known- he was assassinated on November 22, 1963, leaving the world with a myth and a medical mystery.

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# LIGHTHOUSE KEEPER'S MADNESS: FOLK LEGEND OR SOMETHING MORE TOXIC?

By

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## ABSTRACT

To many travellers of the coastal waters, the knowledge of the proximity of land via the lighthouse represents a sense of safety and protection from danger. But for many lighthouse keepers that very same guardian over the water may have represented the reason for their demise. It has long been suspected that individuals who manned lighthouses were geared for a life of solitude and isolation. Many case reports of lighthouse keepers exhibiting abnormal behaviour, committing suicide, or even being driven to murder have often been attributed to the constant isolation and loneliness they were subjected to. Recently, insight into the daily duties of the lighthouse keeper combined with the continual exposure to occupational hazards, has led to the development of an alternative theory. On a daily basis lighthouse keepers were exposed to various forms of mercury, either through contact of the liquid itself, or by inhalation of the odourless mercury vapours continually given off by the lighting system. The large mercury baths supported the several tonnes of glass and metal that made up the Fresnel lighting system, which allowed the apparatus to rotate generating a beam. While the effects of acute mercury exposure are quite obvious, low dose chronic exposure represent one of the more dangerous forms of mercury toxicity. Chronic exposure to mercury vapour selects the nervous system as the main target, exerting symptoms that may occur within weeks, but more commonly developing insidiously over a period of years. Several neurological effects include; short-term memory loss, incoordination, weakness, confusion, and psychological changes like depression and neuroticism. While the effect of mercury toxicity on lighthouse keepers may never be substantiated, the fear of mercury contamination at currently functional and historical lighthouses has prompted testing of at several sites along the coast. This testing has led to the closure of some lighthouses to the public and plans for conversion away from the mercury-driven system.

## Lighthouse Keeper's Madness

*"A number of lighthouse stories may be entirely apocryphal but some have been so firmly entrenched in tradition that they should be given serious consideration and there is always the possibility of confirmation coming to light in the future." (Hague and Christie 1975)*

To many travellers of the coastal waters, the knowledge of the proximity of land via the lighthouse represents a sense of safety and protection from danger. Since the first written record of lighthouses in Alexandria during the third century BC, and likely long before that, the lighthouse has served as a navigational landmark for those travelling by sea (Hague and Christie 1975). But for many workers of the light, that very same guardian over the water may have been the reason for their demise. For some time now there have been a number of stories questioning the sanity of lighthouse keepers and their assistants. Over the years tales have surfaced surrounding lighthouses that have gradually been woven into the folklore of the surrounding community. Although the documentation encompassing some of these events is imprecise, some recordings have survived.

The occurrence of keepers going mad seems to be a global phenomenon, with stories of tragedy throughout the world. For example the first three lighthouse keepers in Australia's Rottne Island lighthouse constructed in the 1800's all committed suicide (Schwarcz 2001). Another lighthouse, on the Pembrokeshire Coast in West Wales (the Smalls lighthouse) saw the fate of a pair of lighthouse keepers. Following the supposedly 'natural' death of one of the lighthouse keepers, the remaining keeper felt obliged to preserve the corpse for fear of being accused of murder. He constructed a crude coffin, placed the body within, and proceeded with great difficulty to hang it from the gallery to await the arrival of relief. The legend goes that the weather delayed the relief party who upon arrival found the remaining keeper on the brink of dementia (Hague and Christie 1975). Whether the keeper had good intentions in preserving the corpse, or was demented prior to and caused an 'unnatural' death, was not substantiated. The Minots Ledge lighthouse off the coast of Cohasset, Massachusetts, had a reputation in the United States as being one of the worst assignments in the Lighthouse Service. Numerous incidents have been compiled of lighthouse keepers claiming that the lens and lamp on the lighthouse were being mysteriously cleaned and filled. One keeper complained that the round tower drove him crazy with its lack of corners, while another committed suicide before a reason could be found (De Wire 2002).

Although many stories surrounding lighthouse keepers are embedded in local folklore, documentation surrounding lighthouses on the West Coast of Canada has been particularly accurate due to the composition of two historical novels, compiled using keeper's logbooks, interviews, and telegrams. Several reports of lighthouse keepers, assistant keepers, or the keeper's wives demonstrating abnormal behaviour were documented. The range of behaviours spanned from isolated incidents with relatively short progression to behaviours that worked their way insidiously into the lighthouse keeper's demeanour. Atypical behaviour was widely variable ranging from mild symptoms to insanity, depressive traits, and even suicide. One incident of insanity involved William Brown, the first lighthouse keeper stationed on Ballenas Island, B.C., 1905. In May of that year, attention was first drawn to his condition when a bizarre telegram landed him in city lockup and later the insane asylum in New Westminster after his wife claimed he was "hopelessly insane and violent". Upon recovery and a return to the lighthouse in June of that year, he relapsed and was sent to New Westminster in April 1906 following another telegram pleading for help (Graham 1985). Documents tell the story of one assistant keeper at the lighthouse in Langara Point in the 1950's who went "off the deep end", guzzled some methyl hydrate and disappeared into

the bush. As the remaining keepers were organizing a search party, he burst into the radio room of the lighthouse shrieking, stark naked, and swinging an axe (Graham 1986). Other cases involved depression and confusion in lighthouse keepers, typically resulting in suicide. Such was the fate of Laurie Dupuis keeper of Egg Island, who shot himself in June 1950 over the misinterpretation of a telegram from his wife (Graham 1986), or Remite Ernest Vargas, a keeper at Triple Island in 1960. He struggled in and out of delirium for four days and nights trying to kill himself, only to succeed when the head keeper fell asleep from the exhaustion of trying to save him while manning the light alone. Other keepers working in the lighthouse experienced a range of milder symptoms like delirium, paranoia, and even repeated bouts of ill health as was the case of Herbert W. Smith, keeper of the light in Cape Mudge, B.C. from 1918-1927 before he was forced early retirement due to episodes of dizziness and lapses in memory lasting up to half an hour.

While many of the documents centre on the state of lighthouse keepers, some reports describe the wives of keepers experiencing depression. Often keepers blamed the lack of social contacts for women at the lighthouse as the reason; one stated, “my wife has gone crazy” claiming the lack of mail was the reason for her breakdown (Graham 1986). But some episodes were so extreme that solitude alone seems a weak explanation. Such was the case of the wife of a keeper at the Kains Island Lighthouse, who over the course of two years (1916-1918) experienced a progressive decline in sanity. The keeper, John Henry Sadler, described his wife’s demise.

*“Sometimes she would begin screaming and calling for help. She repeatedly talked to herself and often recalled the time that I nearly drowned when the skiff overturned. Her mind sometimes went back to her home in the Old Country, to her girlhood days in Stirling, Scotland. I was forced to tie her to the bed-posts at times, fastening her hands above her head. When she was free and I was not watching her, she would tear books to pieces and throw plates and tablewear on the floor. Once I just caught her as she was about to leap over the verandah. At the time she appeared to see a vision of her father and she was calling to him. I couldn’t get her to eat. Goat’s milk, half a cup at a time, was all she would take. The children languished also from lack of nourishment, especially the little ones. (Graham 1985)”*

### **Legend or Something More Toxic?**

It has long been suspected that individuals and families who manned lighthouses had personality characteristics that were geared for a life of solitude and isolation. However, case reports like the ones described above have often targeted loneliness and constant deprivation as a reason for the instability seen in many lighthouse keepers (Van Netten and Teshke 1988). In fact, studies have shown that social isolation and or deprivation is a strong risk factor for depression (Puntil 1998). Many of the lighthouse keepers displayed signs of depression which include: feeling agitated, restless or slowed down, sleep disturbances with insomnia or too much sleep, decreased concentration which may affect memory, and a focus on death or suicidal ideation with or without a plan (Puntil 1998, Lambert 2002).

Although depression may serve to explain some of the signs described or witnessed by other individuals, the prevalence on a global and local level of these behaviours within lighthouse keepers demands further investigation as to other possible causes. In addition depression and isolation does not account for symptoms like hallucination or insanity that was often described in these keepers. The search for a common link between the range of behaviours exhibited and the nature of employment leads one to explore the possibility of a common toxin that was present within the lighthouse. Furthermore, occupational exposure to this toxin must also account for the variety of behaviours displayed by lighthouse keepers and family members. A familiar theme among lighthouses in the period between the late 1800's and 1900's was the use of the mercury drive system to aide in the operation of the light (Anonymous 2002). Mercury is a known toxic compound and may serve as an explanation for many keepers going mad.

### **Mercury as the Toxin**

In many of the larger coastal lighthouses, mercury served as a frictionless support bearing for the mantles, reflectors and lenses that made up the mainstay of the light. As the demand for larger beams on the waterfront increased, lighthouse optics made great advances to assist in this function. The large Fresnel lens system designed by Augustin J. Fresnel (1788-1827) had lenses classified between 1<sup>st</sup> and 6<sup>th</sup> order (Hague and Christie 1975, Anonymous 2002). The larger lenses or the 1<sup>st</sup> and 2<sup>nd</sup> order lenses were used for coastal lighthouses that required long-range viewing. The lens could be as large as 10-12 ft high, 6 ft wide and weigh upwards of three tons (Anonymous 2002). This lens and light system would be supported by a mercury bath with a volume of 900 lbs. Not only did the mercury function to support weight, it allowed the light to generate a flashing beam at 5-15 second intervals, when the gears (like those of a grandfather clock) were wound up (Graham 1985). Thus mercury, a toxic compound, was a mainstay in many of the lighthouses that served to mark the coastal shores.

Mercury was present in many lighthouses during the 19<sup>th</sup> and 20<sup>th</sup> century, but the link between presence of the toxin and its delivery to the body needs to be understood. Insight into the required duties of the lighthouse keeper makes it plausible that keepers of that time were exposed to mercury on a daily basis. Log books describe how the lighthouse keepers would routinely lower the mercury bath, wipe dust and debris off the surface with a rag, drain the metal off, strain it through Chamois leather and top up the levels as required (Graham, 1985). In addition to the direct handling of mercury via the skin, the metal vapour would expose the lighthouse keeper to high concentrations by inhalation (Graham 1985). Anytime the keeper was working within the area of the lens and lighting system exposure to mercury vapour would have occurred.

During this period, the keeper was required to spend more time in the upper area of the lighthouse for a number of reasons. First, there was the cleaning of the lens system itself. The manual on the "Rules and Instructions for the Guidance of Lighthouse-Keepers" had thorough instructions that demanded the lens undergo "daily, patient, and skillful application of manual labour in rubbing their surfaces". Secondly, lamps in the lighthouse were powered by colza oil or the cleaner burning kerosene used after the 1890s. Lighting of the lamp was a

careful process, and occasionally the lamp would blow out, coating the entire inner surface with oily soot, which on a bad night could require the keeper to make three or four additional trips for cleanings (Graham 1985). On top of all this, the keeper was required to make several trips to the upper room every three hours during the night to reset the gears (identical in design to the lead pinecones that powered the antique grandfather clocks) in order to generate the rotating beam (Graham 1985). The potential time spent by the lighthouse keeper in the area where the greatest concentration of mercury vapours was present was substantial. In addition, other factors that have an impact on the dose of exposure need to be considered. Keepers would have spent long hours in the lighthouse and routinely worked shifts greater than the standard 8-hour day or night. Added to this is the chance that many keepers and their families were exposed on a continual basis. Some of the earlier lighthouses had the house attached directly to the light, or had the light directly on top of the house, while some required that keepers live within the lighthouse tower itself, with no escape from the exposure of mercury.

### **Toxic Effects of Mercury Vapours**

The majority of occupational exposure to mercury is to mercury vapour (Clarkson 1997). The vapour is a highly diffusible and lipid soluble substance allowing it to readily cross cell membranes in the body. The major entry site of mercury vapour is through the lungs. Mercury diffuses through the epithelial cell barrier into the blood stream, which allows for easy mobility throughout the body. Unlike many other compounds, mercury will readily cross the blood-brain barrier, leaving the brain as a major target site for mercury vapour (Clarkson 1997). Once inside the tissues, mercury is oxidized to the mercuric ion where it exerts toxicity. Minor levels of liquid mercury are also absorbed through direct contact of the compound with the skin. This is not as much of a threat to the body because 50% is lost to exfoliated skin cells compared to the inhaled form of mercury where 80% is retained within the system (Clarkson 1997).

Depending on the dose and timing of the exposure, mercury toxicity can present in different ways. For an acute exposure ( $1 \text{ mg/m}^3$ ) a chemical pneumonitis occurs with damage to the airways, producing respiratory distress with lung crackles and wheezes (ATDSR 1999, Clarkson 1997). This type of acute exposure may have occurred in the lighthouse keepers; it would not have been on a frequent basis, and could have been diagnosed as pneumonia. It is more likely that lighthouse keepers would be exposed to chronic low doses of mercury in the  $50\text{-}100 \text{ }\mu\text{g/m}^3$  range. This type of exposure creates more subtle effects on the function of the nervous and renal systems (Clarkson 1997). Chronic low dose exposure can affect the nervous system primarily by causing a fine tremor in the hands (which may be undetectable), non-specific behavioural effects, damage to short and long-term memory, insomnia, decreased ability to concentrate, dizziness, and fluctuating mood changes which includes depression (Clarkson 1997, Olson 2002). Many of these symptoms were seen in lighthouse keepers during that time and chronic low dose mercury exposure is a plausible explanation.

## **Evidence of Mercury in Lighthouses and their Keepers**

The presence of mercury vapour within the lighthouse and keepers has undergone very little study, as little was known about the dangers until recently. One study conducted in 1986 evaluated the mercury levels in the lighthouse, and the presence of mercury in the keepers and their wives on a lighthouse station in B.C. (Van Netten and Teschke 1986). The study evaluated mercury vapour levels throughout the lighthouse on two days in June and August of that year. In addition, urine samples were collected from the two keepers and their wives who lived at the station. The study showed that at temperatures below 25°C mercury vapour concentrations at the level of the lens and lighting system were 4.8 µg/m<sup>3</sup> (23.8 °C in June) and at temperatures above 25°C (30.7°C in August) levels were five times as high measuring 26.3 µg/m<sup>3</sup> (Van Netten and Teschke 1986). Urine samples at both time points were less than 4.0 µg Hg/24 hour in both keepers and their wives (levels greater than 100 µg Hg/24 hr considered high). While levels of mercury vapour measured in this particular lighthouse were low, the study clearly showed the presence of higher levels of mercury during times when temperatures in the lighthouse were greater than 25°C. By the time this study was conducted lighthouse keepers were aware of the dangers of mercury vapour toxicity, and implemented appropriate safety precautions to prevent exposure. Protective masks and gloves were worn during any handling of the mercury, and keepers consciously reduced the amount of work time in the lighthouse tower. In addition, the keepers ensured adequate ventilation of the lighthouse by leaving ventilation holes at the bottom of the tower and up the sides open so that air would flow by convection out the top of the tower (Van Netten and Teschke 1987).

Studies conducted in the 1980's are hard to extrapolate back 80-90 years. Keepers were not aware of the many dangers of mercury and did not wear protective gear in those days. Another prevailing factor was the amount of time they spent in the area where the lens and lighting system was kept. Keepers routinely cleaned and maintained the lens and mercury bath, lit and cleaned the lamp, as well as reset the gears every three hours to allow the light to rotate. All of this additional time in the upper area of the lighthouse where the mercury bath was would have allowed for greater exposures to mercury vapour.

## **Recent Updates**

In the present day, many of the lighthouses on the West Coast of Canada have been converted to automation, reducing the need for permanent keepers at many stations along the coast. As a result, lighthouses of the past are historical sites and are frequently visited by tourists (Tanod 2000). During the Fall of 1999 increasing concern over the potential for mercury exposure in some of the lighthouses called for restricted public access to a dozen lighthouses by the Coast Guard of Canada, after testing found levels of mercury above safety standards (majority were on the East Coast) (Harnett 1999). Even though many lighthouses were considered 'safe', perceived health concerns led to the conversion of the last three mercury driven systems at Pachena Point, Langara and Triple Island on the West Coast of Canada, to smaller automated lights (Tanod 2000). The concern that the presence of mercury in these lighthouses poses a health threat, likely means that this same danger was present over a hundred years ago.



## Summary

Lighthouse keepers on the West Coast of Canada displayed a number of bizarre and erratic behaviours that may be explained by chronic low dose mercury vapour toxicity. Many of the larger coastal lighthouses contained mercury, to support the large weight of the lens and lighting system. Before recent safety standards and exposure limits, lighthouse keepers would have spent a large amount of time within the lighthouse without protection. Although difficult to substantiate, exposure to potentially toxic levels of mercury is a plausible explanation for the actions and behaviours displayed by lighthouse keepers during the early 1900's on the West Coast of Canada.

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# **CLEFT LIP AND CLEFT PALATE REPAIR: VICTIMS OF SURGICAL INDIFFERENCE?**

By

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## **ABSTRACT**

The evolution and documentation of cleft lip and cleft palate repairs reflects the social attitudes over the centuries towards those born with congenital abnormalities. Cleft lip repairs are documented as far back as 390 AD in ancient China. These early descriptions however are anecdotal, not accompanied by scientific illustrations, and are often underscored by social rejection faced by the patient. The first illustrations of cleft lip repair are by artists of the late Gothic and Renaissance period, including Leonardo da Vinci and Albrecht Durer. These artists used images of symbolic characters with surgically repaired cleft palates to represent society's views of those with congenital deformities. For example, the painting "Temptation of Christ in the Desert" by van Oostanen portrays the Devil with a repaired cleft lip. This painting is thought to represent the medieval Christian traditions of seeing physical deformity and disease as a punishment from God for one's sins. It was not until the sixteenth century that scientific attitudes towards the cleft lip repair were recorded, and the first scientific illustrations of the cleft lip repair were published by Pierre Franco of Provence (1505-1577).

Ambroise Pare, a contemporary of Pierre Franco, has also been credited with early surgical advances in the cleft lip repair. Pare was also the first to describe the use of obturators in the repair of a congenital cleft palate in his book "Surgery", published in 1579. Until Pare, as with cleft lip repair, stories of cleft palate repair had been anecdotal. However, it wasn't until 300 years after the publication of Pare's book that Snell first attempted the treatment of congenital cleft palates with Pare's obturators. Why did the development of repair of the cleft palate lag behind that of the cleft lip so obviously? For the same reason that early attempts at cleft lip repairs were so muted- social stigma. Many physicians and surgeons prior to the nineteenth century believed that most palate defects were the direct result of syphilitic infection.

The evolution and documentation of cleft lip and palate repairs reflects societal attitudes over centuries towards those born with congenital anomalies. Cleft lip repairs are documented as far back as 390 AD in ancient China. The early descriptions of cleft lip repair are anecdotal and not accompanied by scientific detail or illustrations. The earliest detailed illustrations of cleft lip repair are actually by artists such as Leonardo da Vinci of the late Gothic and

Renaissance periods. Surgery pioneers Pierre Franco and Ambroise Pare were among the first to publish scientific details and figures outlining cleft lip and palate repair procedures in the sixteenth century. Surgeons neglected cleft palate repair, due to its association with syphilitic infection, until the nineteenth century, when plastic surgeon James Snell reviewed Pare's obturators described three hundred years earlier and attempted to use them in infants with congenital cleft palate.

Artifacts depicting unrepaired cleft lips date back more than 4000 years (1). A noteworthy example of this is a clay figure from Central America, illustrating a bird-man with an anatomically detailed continuous cleft lip and palate (1). A sculpture depicting the head of a warrior with an unrepaired, anatomically correct cleft lip from the Moche period has also been described (1). While ancient sculptures illustrated the pathological details of the unrepaired cleft lip and palate, it was not until the Chin dynasty (317-419 A.D.) in ancient China that a clear account of an attempt to correct a cleft lip could be found. This early and anecdotal account describes a farmer's son, Wei Yongchi, born with a cleft lip. As the legend describes, despite being born with the "destiny to become a man of wealth and power", unless his facial imperfection was repaired, he would be unable to fulfill his destiny. At the age of 18, this young farmer sought out a doctor who told him that "he could cure his condition with a knife and by stitching the edges together; after the operation it would be necessary to rest the affected parts for 100 days". Following the repair, Wei Yongchi became the Governor General of six provinces, fulfilling his destiny of success (2). While this reference is significant in that it outlines for the first time in history an approach to operative and postoperative management of the cleft lip, it also emphasizes the social implications of having such a malformation. Early accounts of cleft palate repair are much less descriptive. The legend of Demosthenes, a Greek orator from 384 – 323 B.C., describes Demosthenes filling his mouth with pebbles from the seashore as he orated above the waves to overcome his speech defect, thought to be secondary to a cleft palate. Other historical accounts of cleft palates are equally vague (5).

The social implications of being born with a cleft lip and palate were highlighted by artistic impressions of those who had undergone repairs in the 15<sup>th</sup> and 16<sup>th</sup> centuries. Oil paintings and other artwork of the late Gothic and Renaissance periods predated scientific depictions of cleft lip and palate repairs by more than one hundred years. In Leonardo da Vinci's pen drawings entitled "twelve fragments illustrating busts of ridiculous men and women in profile", the profile of a man with a poorly repaired cleft lip was included. In Jacob Cornelisz van Oostanen's portrait entitled "Temptation of Christ in the Desert", a profile of the Devil with a surgically corrected cleft lip and palate is seen. It is thought that this represented the medieval Christian tradition of seeing physical deformity and disease as punishment from God for one's sins (1). Fifteenth century German artist Luca Moser painted the profile of St. Cedonius, a bishop, with clear physical traits consistent with a repaired cleft lip and palate. It is thought that this portrait was Moser's response to the second part of the Mosaic law which refers to the priesthood: 'No man that hath a blemish of the seed of Aaron the priest shall come nigh...to offer the bread of his God...nor come nigh unto the alter because he hath a blemish', or to the statement 'a flat-nosed man is unfit for priesthood' in Talmudic literature (1). At around the same point in history, author and poet Thomas

Ragwaldinopoika, who was born with cleft lip and palate, described his moral struggle while deciding if he should undergo a repair:

“It was also in my mind, When a cure I tried to find, That God’s will it could not be, Since at birth ‘twas given to me.” (3). Clearly, the scientific progression of cleft lip and palate repairs at this time was slowed by the overwhelming societal and religious attitudes towards those with facial congenital anomalies.

Finally, in the sixteenth century, scientific headway was made in the field of cleft lip and palate repair. French medical colleagues and rivals Pierre Franco and Ambroise Pare raced to publish the first printed book on surgery. Franco’s “*Petit Traite, etc*” was published first (4). Pierre Franco was one of a group of Inciseurs in Provence. This group would wander from town to town in hunt of operations to perform, and were thus referred to as surgical nomads. There were clear descriptions of two separate approaches to the cleft lip repair in Franco’s text. The first approach involved adjoining the two edges of the cleft lip with a cloth covered with plaster glued to each edge of the cleft lip and then sewn together. The second approach involved simply suturing the edges of the cleft lip together with a hollow needle and thread. (4). Shortly after Franco’s publication, Pare published several surgical texts. Pare was not an inciseur like Franco, but was a surgeon-barber who specialized in trauma surgery. In his text “Surgery”, published in 1579, Pare described for the first time an appliance to restore a palatal defect caused by venereal disease or a gunshot wound. This device, referred to as an obturator, consisted of a plate of gold or silver slightly larger than the defect itself with a sponge on the top edge. This sponge would be inserted into the cavity and would expand when moist to hold the obturator in place (5). Note that the reference to cleft palate repair was applied only to those who have suffered traumatic cleft palate injury. Surgeons prior to the nineteenth century believed that most palate defects were the result of syphilitic infection. Therefore, at a time when patients who were suffering with syphilis were ostracized by society, the development of the cleft palate repair surgery for congenital cleft palates was delayed for social reasons. It was not until 150 years after Pare’s description of the obturators for traumatic palatal defects that a surgeon named Fabricii in his text “Chirurgicis Operationibus” made the first reference to congenital cleft palates. Fabricii noted that Pare’s obturators might be used to repair newborn born with congenital cleft palates that are “unable to suck, and at length die” (5). However, it is believed that James Snell was the first to actually attempt the treatment of congenital clefts with obturators in 1828, a full 300 years after the publication of Pare’s “Surgery”. (5).

While congenital cleft lip and cleft palate have been noted by society for thousands of years, the journey towards recognition by the medical community has been slow because of historical beliefs concerning congenital deformity. Such beliefs continue today to influence the practice and development of medicine.

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# NORMAN BETHUNE AND HIS BATTLE AGAINST TUBERCULOSIS

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## ABSTRACT

**Famous Canadian surgeon, Dr. Norman Bethune is said to have fought three enemies in his life: tuberculosis (TB), fascism and anti-communist activities in China. Much work has been dedicated to the later two issues, however Bethune's battles against TB have received much less attention. *Mycobacterium tuberculosis* has wreaked havoc on the world since the time of the Pharaohs. This 3-4  $\mu\text{m}$  rod shaped bacteria affected Bethune both personally and professionally. In an attempt to keep the bacteria at bay, Bethune developed surgical tools and adapted surgical procedures to treat his patients with TB, as well as himself. Bethune was interested in the social aspects of this illness and recognized the need for the disciplines of sociology and economics to become involved in the improvement in the lot of the TB patient.**

Consumption, "the white plague", tuberculosis: "the most important killing disease of mankind" (Boyd, 1933). Consumed patients present with a classical pattern of symptoms; fever, weight loss, fatigue, night sweats and the cough that eventually kills when there is no longer enough functional lung to provide the oxygen needed for life on this earth. There are reported occurrences of tuberculosis (TB) as far back as there is written record. The Ancient Egyptians reported cases of TB and in the era of Hippocrates consumption was the most common disease (Wilson, 1999). Yet it was thousands of years after the first reported cases that the microorganism responsible for the worldwide havoc of "the white plague" was discovered. It was not until 1882 that Koch isolated the 3-4  $\mu\text{m}$  thin curved rod, *Mycobacterium tuberculosis*, responsible for TB (Boyd, 1933; Osler, 1907).

The life of Dr. Henry Norman Bethune was short, especially when compared to the long history of the disease Tuberculosis. Norman Bethune is often remembered for his communist affiliations in China and his time fighting fascism in Spain (Wilson, 1999). However, Bethune's role in TB therapy is often not recognized (e.g., the Canadian Lung Association on their website, [www.lung.ca](http://www.lung.ca), does not recognize Bethune as a Canadian who contributed to TB therapy).

Bethune was born in 1890 in Gravenhurst Ontario to the Reverend Malcolm Nicholas Bethune and Elizabeth Ann Goodwin Bethune. Early showing defiance of authority it is not surprising that Bethune bucked convention his entire life. Indeed when he joined the medical community his approach to surgery was often unconventional. Although his innovative interventions were sometimes successful; often they were not. (Wilson, 1999; Allan and Gordon 1952).

Bethune's career as a medical student at the University of Toronto was interrupted several times by service in World War I. After leaving his first posting due to a minor shrapnel injury to the left calf, Bethune completed his medical degree and set-up practice in Stratford Ontario (Allan and Gordon, 1952). This was a short lived practice and Bethune soon returned to the military, after he was deemed a coward by a local girl who pinned him with the "white feather" of cowardice. Returning to the war he developed an interest in surgery (Wilson, 1999). His education would not be fully complete until 1922 when he became a fellow of the Royal College of Surgeons of Edinburgh. It was also in Edinburgh that he met and married Frances Campbell Penny (Wilson, 1999).

As a surgeon, Bethune moved to Detroit Michigan to practice, and to teach at the Detroit College of Medicine and Surgery. While in Detroit the disparity between medical care for the rich and poor became frustratingly clear to him. Bethune was known to treat poor for free while charging his very rich patient's exorbitantly high fees (Wilson, 1999). He recognized that his medical care was not going to the root of the problems that were causing the diseases of his poor clients. Bethune thought that a better job and the better quality of life that extra money would bring would be of greater benefit in the long run than his medical treatments. "And what can I do for a prostitute, when her problem is not really that she is diseased, but that she is a prostitute?" (Wilson, 1999)

In 1926, still in Detroit, Bethune was faced with two major problems in his life. His wife was leaving him and he was diagnosed with moderate pulmonary tuberculosis in one lung. Tuberculosis was making him weak. He was losing weight, and coughing up blood. In December 1926, Bethune entered the Trudeau Sanatorium at Saranac Lake New York (Stewart, 1977). He was about to attempt to make the transition from doctor to patient. This proved to be a transition he was not good at; he could not let go of the physician role. He functioned as both doctor and patient. At this time treatment for tuberculosis consisted of rest, fresh-air and the education of the patient about how to live with TB. Bethune was not good at resting or relaxing. He broke all of the rules at the sanatorium, from smoking and wild parties, to trips to town when he felt like it. Bethune was not an ideal patient. At the same time Bethune was highly dissatisfied with the lack of treatment options available for TB (Allan and Gordon, 1952; Stewart, 1977; Wilson 1999). He began his research. He studied endlessly about TB and possible treatment options. It was during these studies that he encountered the artificial pneumothorax. This treatment was proposed based on the cases of 19<sup>th</sup> Century soldiers with consumption whose disease improved after receiving non-fatal bayonet wounds to the chest. These wounds "allowed the affected lung to rest and promoted healing" (Wilson 1999). Bethune wanted this treatment and started a campaign to convince the doctors at Trudeau to perform such a procedure on him. This would involve the insertion of a needle into the pleural cavity and allowing the entry of air (passive or with active pumping). As Bethune's TB affected only one lung, the other lung was still available for use. On October 1927 the surgeons performed the procedure on Bethune (Wilson, 1999). While waiting to see if the procedure worked, Bethune began a creative endeavor to occupy his time and to pour his soul into. The project was a mixture of poetry and painting entitled "The TB's Progress, a Drama in One Act and Nine Painful Scenes". This depicted Bethune's view of his life from birth to prophesized death, with TB's role in the latter (Stewart, 1977).

Bethune's research paid off, and in December 1927, one year after his admission, Bethune was discharged from the Trudeau Sanatorium.

After his time at Trudeau, Bethune returned briefly to Detroit where he rejected all offers of returning to lucrative private practice. Instead he dedicated himself to the possibilities that thoracic surgery held for the treatment of tuberculosis, especially regarding collapse therapies. This required some further education on his part, and he was eager to study under the famous Canadian thoracic surgeon, Dr. Edward Archibald in Montreal (Stewart, 1977; Wilson, 1999). Archibald is famous for his contributions to thoracoplasty (removal of ribs) to collapse tuberculosis-infested lungs (Canadian Lung Association, 2002). Other collapse therapies included the artificial pneumothorax (described above) and the phrenicotomy (the unilateral cutting of the phrenic nerve to collapse one of the lungs). Bethune returned to Canada and studied under Archibald at the Royal Victoria Hospital in Montreal. Here Bethune was regarded as a wild man and unconventional surgeon. It was common to hear Bethune ranting from the surgery, expressing dissatisfaction with the surgical tools available. His discontent led to the development of new and improved tools by Bethune. Bethune rib shears, which Bethune modified from Cobbler's shears, are still in use today. Bethune also developed a pneumothorax machine that actively pumped air into the pleural cavity; Bethune used this machine on himself to maintain his own pneumothorax. His teacher, Archibald, was not a fan of Bethune. Archibald was a methodological surgeon, who found Bethune's surgeries flashy and possibly dangerous (Allan and Gordon, 1952; Stewart, 1977; Wilson, 1999). The medical community tended to agree with this assessment. Bethune however continued his work, treating often the most desperate and advanced cases.

Bethune's reputation with his colleagues may have been less than perfect, but he cared for his patients. When one of his female patients was dying of an advanced case of highly contagious TB, she requested a kiss from her physician. Bethune complied stating that, "A doctor works with more than just medicine" (Wilson, 1999). Another example of Bethune's compassion and unconventional approaches can be seen in how he dealt with a mentally disturbed patient who claimed gastrointestinal distress from a frog he had ingested. Bethune placed a frog in the patient's toilet after an enema. The patient's complaints ceased (Wilson, 1999).

Bethune was somewhat of a cynic with a sense of humor that often offended his colleagues. In his paper "A Phrenicotomy Necklace", Bethune addressed the cosmetic complaints of patients (in particular a film star of the day, Renée Adorée) regarding phrenicotomy scars. He was proposing the use of a "Woolworth's" choker style necklace to determine where to place the incision, which could later be provided to the patient for cosmetic purposes. The sarcastic tone in which he described society's justifications for cosmetic surgery outweighed the practical advice that was actually contained in the paper (Bethune 1932 in Stewart 1932). In another appeal to his colleagues in the paper entitled "A Plea for Early Compression in TB", Bethune (1932) addressed many social and economic issues and well as medical therapy. He acknowledged the distinction between a rich man's and a poor man's tuberculosis. The rich man received treatment and lived, while the poor man died. He acknowledged that more than just medicine was required in the fight against TB; that the socioeconomic component of the disease and treatment outcomes must be addressed. The



poor man did not have access to the means to change neither his external environment (rest and relax at a sanatorium) nor his internal environment (collapse therapy). According to Bethune changes in both the internal and external environment were necessary for successful tuberculosis treatment. He discussed the limited contribution that medicine alone could make in TB treatment and stressed the need for sociology and economics to contribute to the best treatment approach. "Lack of time and money kills more cases of pulmonary TB than lack of resistance to that disease. The poor man dies because he can not afford to live."

In 1933 Bethune was asked by Sacré Coeur Hospital, north of Montreal to head the new Department of Thoracic Surgery (Wilson, 1999). It was during this time that his communist beliefs began to take form and materialize. It would not be long before his battle against fascism in Spain would commence and his final battle for communism in China would begin.

Dr. Norman Bethune was an eccentric individual. He was a free thinker who believed that medicine and medical therapy alone were not sufficient to address the health problems faced by the medical field. He acknowledged the interdependency between socioeconomic status and health (especially in TB therapy). This combined with his innovation and persistence in surgical developments made Norman Bethune's contributions to TB therapy both interesting and progressive. In the end however, he was wrong in his predictions about his own death. The white plague did not consume him in the end, however he did not eliminate this enemy from the world either. Currently in Canada approximately 2000 new cases of TB are reported to Health Canada each year (Health Canada, 2002). This is much lower than the rates observed in Bethune's time and much lower than rates observed in developing nations today. What is alarming is that in spite of the discovery of chemoprophylaxis for TB, *Mycobacterium tuberculosis* seems to be growing to evade us once more with resistant forms of the bacteria on the rise. The time to remember the lessons of Bethune about social, economic and surgical treatments for TB is approaching.

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# **PIONEERS OF HEART SURGERY**

By

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## **ABSTRACT**

**For most of history, the human heart has been regarded as a forbidden organ too delicate to tamper with. It might have remained so, were it not for World War II. Of course, advances were made in the diagnosis and treatment of various diseases during that period of time, but none were more spectacular than the development of cardiac surgery. Hence, the years between 1945 and 1975 have been called the Golden Age of Cardiac Surgery.**

**At the start of the World War II, surgeons had continued the conservative approach of not removing the bullets from the hearts of patients who had survived the original trauma and were in a non-emergency state. However, Dr. Dwight Harken knew that if the bullets were left in or near the heart, many patients would still die of sepsis or embolism. Faced with his clinical problem, he began operating on dogs to find a good technique to remove a bullet from the heart. His technique was to cut a small hole in the side of a beating heart, insert a finger and very carefully, locate the bullet and take it out. But how could heart surgeons open up the heart without their patients bleeding to death? Temporarily stopping a patient's circulation only gave doctors about four minutes to work before brain damage from oxygen deprivation took place. And so, Dr. Wilfred Gordon Bigelow came up with a solution. That is, induce hypothermia to reduce the oxygen requirements of the body and then interrupt the circulation of blood through the heart before the open heart surgery. This undoubtedly gave the surgeons some extra time to work on the heart, but what about heart conditions that require longer periods of time? And how did the pioneers go about solving fatal arrhythmias which were frequently encountered during or after a heart surgery? Hence, this paper will review six important pioneers of heart surgery and their various contributions toward our current knowledge of open heart surgery.**

For most of history, the human heart has been regarded as a forbidden organ too delicate to tamper with. It might have remained so, were it not for World War II. Of course, advances were made in the diagnosis and treatment of various diseases during that period of time, but none were more spectacular than the development of cardiac surgery. Hence, the years between 1945 and 1975 have called the golden age of cardiology.

At the start of the World War two, surgeons had continued the conservative approach of not removing the bullets from the hearts of patients who had survived the original trauma and were in a non-emergency state. However, Dr. Dwight Harken knew that if the bullets were left in or near the heart many patients would die of sepsis or embolism. Faced with his clinical problem, Dr. Harken began operating on animals to find a good technique to remove a bullet lodged in the heart. His technique was to cut a small hole in the side of a beating heart, insert a finger and very carefully locate the bullet and take it out. Of his first batch of dogs, all 14 died. Of the second group of 14, half died. Of the third group of 14, only 2 died. And after a few trials and improved techniques, he and his team set out to remove bullets from the human heart using a variety of the latest surgical techniques available at that time. Prior to operation, the location of the bullet was pinpointed by fluoroscopy. At operation, the patient would be induced by intravenous pentothal sodium anesthesia, intubated with a large-bore endotracheal tube and maintained with nitrous oxide, ether, oxygen and assisted respiration. During the operation, the patient would, of course, lose a tremendous amount of blood. Hence, rapid and massive blood transfusions were needed to keep the patient alive. Whole blood was often administered, under pressure, at rates up to one and one-half liters per minute. Penicillin, which was just beginning to make an impact on thoracic surgery, was often given in 10,000 unit injections at that time. Remarkably, Dr. Harken reported that there were no deaths among these patients.

However, heart surgeons faced the problem of opening up the heart without their patients bleeding to death. Temporarily stopping a patient's circulation only gave doctors about four minutes to work before brain damage from oxygen deprivation took place. Like others, Dr. Wilfred Gordon Bigelow, who is better known as Dr. Bill Bigelow, realized that heart conditions would never be cured until the circulation of blood through the heart could be stopped during an operation. Dr. Bigelow first became interested in hypothermia in 1941. As a resident surgeon at the Toronto General Hospital, he had to amputate the frostbitten fingers of a man from the Canadian northwoods. In preparing for the operation, he was amazed to find how little had been written on the subject. And so, he pioneered research on hypothermia and its physiological effects.

One night he awoke with a simple solution to stop the circulation of blood through the heart. That is, cool the whole body, reduce the oxygen requirements, interrupt the circulation and open up the heart. This idea undoubtedly sprang from his previous interest in hypothermia. However, this kind of idea at that time was considered dangerous and something to be avoided at all costs. Hence, for the next fifteen years, Dr. Bigelow did lots of research on hypothermia. Also, he perfected surgical techniques involving the use of hypothermia. Although he and his team did not perform the first open-heart surgery on a human, it was through their procedure that the first open-heart surgery in humans was made possible.

Also, Dr. Bigelow played an important role in developing the cardiac pacemaker. In 1949, during the course of his hypothermic research, Dr. Bigelow accidentally stumbled upon the idea for a cardiac pacemaker. While performing a routine hypothermic experiment on a dog, the dog's heart unexpectedly stopped beating. Cardiac massage did not restart it. In frustration, Dr. Bigelow poked it with a probe he was holding which immediately produced a

strong contraction. He poked it again, and produced the same result. After a few minutes with this stimulation, the anesthetist observed a blood pressure, indicating these were real contractions forcibly expelling blood in a normal manner. Therefore, Dr. Bigelow was the first one to discover that an external artificial stimulant could get the heart to beat. It was later found that an electrical impulse had the same effect, and this set a basis for the invention of an electrical pacemaker.

The third pioneer of heart surgery is Dr. Clarence Walton Lillehei, who is better known as Dr. C. Walton Lillehei. He graduated from the University of Minnesota and has been called the “King of Hearts” or “the father of open heart surgery” for his pioneering research as a surgeon and inventor of medical devices. In 1952, Dr. Lillehei and Dr. John Lewis induced hypothermia and attempted the first open heart surgery, which took place a year before Dr. John Gibbon invented the heart-lung machine. The operation was done on a five-year-old girl who had been born with a hole in her heart and the girl survived the operation. However, Dr. Lillehei and his colleagues had to solve the problem of keeping the patient’s blood flowing and receiving oxygen while reducing the blood flow to the heart. With the first few patients, they induced hypothermia. Later, they experimented with cross-circulation, that is, using a healthy adult’s body to filter the patient’s blood. Although the technique worked successfully for dozens of patients, other physicians at the hospital were quite against it. Eventually, Dr. Lillehei worked with a colleague, Dr. Richard De Wall, to develop the first mechanical blood oxygenator. This device had a pump that made it a “heart-lung machine” and was used for the first time in 1955.

As Dr. Lillehei continued to refine his surgical techniques, his patients survived open-heart surgery at higher and higher rates. But one frequent complication of heart surgery — especially surgery done on the septum — was heart block, an often-fatal condition which developed during or after surgery and caused irregular heart beats. So, Dr. Lillehei and his colleagues began experimenting with using electric shocks to restore normal heart beats. These experimentation and Dr. Bigelow’s discovery eventually led to the development of pacemakers, which delivers low dosage electric shocks to keep the heart in rhythm. The first few pacemakers were used in 1957. They restored normal heart rhythm during surgery, and were later modified for their use after surgery as well. The first few pacemakers were large instruments that needed to be plugged into an AC outlet so patients had no mobility while using one. Therefore, Dr. Lillehei collaborated with an electrical engineer and a part-time television repairman, Earl Bakken, to design pacemakers that were battery-operated, portable and eventually implantable. Later, Bakken and his brother-in-law begin developing and producing these pacemakers in the late fifties. They then incorporated their business in 1958 under the name Medtronic Incorporated, which is now the world’s largest medical technology company.

The next pioneer of heart surgery is Dr. John Gibbon. Dr. Gibbon was born in Philadelphia and he did all his work at the Jefferson Medical College there. Dr. Gibbon is widely recognized for his pioneering efforts in surgery and the invention of the heart-lung bypass machine. In 1935, he successfully used a prototype heart-lung bypass machine to keep a cat alive for 26 minutes. The machine used a refined method of cascading the blood down a thin sheet of film for oxygenation, rather than the original whirling technique that could

potentially damage blood corpuscles. The heart-lung machine had a vertical-sheet oxygenator consisting of fourteen 12-by-18-inch finely machined stainless-steel screens, enclosed in a Lucite chamber. Oxygen and carbon dioxide flowed into the chamber at a rate of 11 litres/minute. The machine was primed with 4 to 4.5 litres of freshly drawn heparinized blood that ran through the machine to become oxygenated. In 1953, Dr. Gibbon performed the world's first successful open-heart operation on a girl with an atrial septal defect, using the heart lung bypass machine. The machine totally supported her heart and lung functions for more than half the duration of the operation. This type of surgery, using modern versions of Dr. Gibbon's machine, is now commonly used in various heart surgeries for adults and children.

In 1967, a South African surgeon, Dr. Christiaan Barnard, did the first human heart transplant. He transplanted the heart of a 23-year-old woman who was killed in a motor-vehicle accident into the chest of a middle-aged man. When the news spread, there was an increase in number of patients demanding to receive heart transplant. However, these surgical triumphs proved short-lived. Patients began dying of either rejection or infection and by 1971, 146 of the first 170 heart transplant recipients were dead. What first looked like another surgical miracle had turned into a disaster and heart surgeons who had promoted the operation admitted defeat.

Dr. Norman Shumway, who is an American surgeon, developed an intense interest in cardiac surgery when he was under Dr. Walton Lillehei and Dr. John Lewis. During his residency at the University of Minnesota, he participated in the first open-heart operation done by Dr. Lillehei and Dr. Lewis to seal up a hole in a girl's heart. And so, in 1958, Dr. Shumway began his studies on cardiac transplantation. On January 6<sup>th</sup>, 1968, he performed the world's fourth human-heart transplant. Unlike the other heart surgeons, Dr. Shumway did not give up easily when the patients who received heart transplant started dying away. So, he continued his research on heart transplantation. Throughout the 1970's, he built a team of scientists and doctors to undertake the problem of tissue rejection. His team devised a way of spotting rejection attacks by feeding a catheter into the heart and removing a piece of myocardium for examination. Only when signs of rejection were seen were doses of the dangerous immuno-suppressive drugs increased. At the same time, in Norway, a fungus called *Tolypocladium Inflatum* was found to produce a substance called cyclosporin as its natural metabolite. It appeared to have superb immuno-suppressant properties, that is, it controlled organ rejection without knocking out all resistance to infection. And so, in the hands of Dr. Shumway, cyclosporin transformed the picture for heart transplant recipients. Hospitals around the world began to re-open their heart transplant units and, with the use of cyclosporin, the survival rate began to rise. In addition, Dr. Shumway also made huge contributions in other aspects of cardiac surgery. For example, his animal research resulted in the use of homograft and autograft valves for the replacement of diseased valves. He also made significant advancements in the treatment of aortic dissections and aneurysms.

In summary, there can be no doubt about the contributions made by these few pioneers of heart surgery. Dr. Dwight Harken pioneered heart surgery in removing foreign objects from the heart. Dr. Wilfred Gordon Bigelow pioneered research on hypothermia and its physiological effects. Also, he and Dr. Clarence Walton Lillehei played an important role in

developing the cardiac pacemaker. Dr. Lillehei pioneered the first open-heart surgery in a five-year-old girl and developed the first mechanical blood oxygenator. Dr. John Gibbon pioneered the invention of the heart-lung bypass machine while Dr. Christiaan Barnard did the first human heart transplant. Last but not least, Dr. Norman Shumway increased the survival rate of heart transplant patients by using cyclosporin and he made significant contributions in the treatment of valvular heart disease.

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# THE GURDS - A LESSON IN MEDICINE

By

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## ABSTRACT

**Three generations of Gurdy devoted their lives to the art and science of medicine. For over 100 years they influenced the lives of patients and colleagues throughout Montreal, Canada and the United States. Their accomplishments contributed to many advancements in surgery and trauma, yet their compassion and dedication show us how little the essentials of medicine change.**

The Gurd family devoted their lives to medicine over three generations. While each generation made a distinctly unique contribution they shared in common a passion and devotion to their careers. They also showed an ambition to advance both the art and science of medicine, and it is these attributes that set them aside as a family.

The book written on their family saga by Fraser N. Gurd, son of Fraser B. Gurd, and grandson of David Gurd; contains not only stories of their accomplishments but also a glimpse of medical advancements and social changes in Canada over more than a century. It is interesting to see how much medicine has changed – from technical advancements and new treatments to the changing requirements and needs of patients. For example, in the 1800's doctors dealt with epidemics of small pox and cholera, while during WW I and II the need for trauma care developed. While change has been dramatic and rapid, the story of the Gurdy also makes us reflect on how very little the fundamentals of medicine have changed.

- There will always be a constant strive to improve patient care and patient outcomes.
- As always, there is never enough money! Throughout the story of the Gurdy there are numerous references to the financial struggles of physicians, patients, and the system. Doctors, with “hardly enough pay to keep them in cigarettes”. Stories during the depression years of patients begging not to be discharged, hoping for a few more days of room and board. Soon after medicare began providing complete hospital and physician coverage, Fraser N. Gurd stated his belief that “The government could not afford indefinitely to pay for complete medical services.” This statement was made in the 1970's, and is a reminder that the problems we face today are by no means new issues or unique to our generation.
- Even in late 1800's, physicians and educators recognized the importance of continued learning and evidence-based medicine! In a faculty address made to the 16 member graduating class of McGill 1879 it was said, “the practitioner who is content with what he has learned during his pupillage will soon fall behind!”

The Gurd family began as many Canadian families - hardworking parents who immigrated from Ireland with hopes of providing their family a better life and more opportunities. The parents of this family can be proud that their future generations definitely took advantage of the opportunities they were offered.

The Gurd family originally settled in Montreal, the hub of the country in 1850's. David Gurd was the first to enter the medical profession. He was likely spurred on by his older brother, who was also interested in medicine but was forced to support the family after their father took too keen an interest in the pint. In the late 1800's, similar to the present, medicine was a difficult career to enter. David chose pharmacy as a foundation for his medical career. It gave him the necessary requirements for medicine at McGill – "knowledge of English, French and Latin, the first 4 rules of arithmetic, vulgar fractions, and decimals". Of course evidence of a good moral character was also required and he was accepted in 1875. As an example of how much has changed since this time, one of David's first lectures in surgery described how wounds could progress from local redness, to blood poisoning and death. The treatment,

*"Fresh air, avoid extremes of temperature, bathe the wound, and encourage drainage. Stimulants were used at intervals – wine, especially champagne, brandy, - and always a nutritious diet."*

Pasteur was just starting his work. The use of iodine as an antiseptic was taught, strangely enough before "germs" were accepted as significant. Aseptic technique was in its infancy, with the introduction of carbolic spray as an antiseptic for wounds and to kill the newly discovered microbes that were transmitted by air. These changes resulted in dramatic improvements in patient mortality. Before the newer techniques were introduced "results of amputations during the last 2 years using the old system – 4 amputations of the thigh – all were fatal. 6 amputations of the leg, 4 were fatal" New changes based on the Lister antiseptic method, published in 1879, reversed these numbers – of 18 amputations, only 1 died. While they may not have described it in these terms, the new techniques introduced a significant relative AND absolute risk reduction, and represent one example of the dramatic changes David experienced during his medical training and as a physician.

After graduating in 1879, David opened his home practice. At this time, staff surgeons actually preferred to operate in their patient's homes. This way they could avoid the hospital policy which strictly forbade them from charging for their services. House calls took up majority of a doctor's hours. Calls were received at any time, any weather, and in any way. David experienced the advent of the telephone with all of its benefits – faster communication and a method of evaluating the urgency of calls. An experienced ear could tell the difference between the cough of diphtheria or croup over the phone, only one of the two requiring urgent treatment.

David had a special interest in obstetrics and started his baby practice soon after he was married (to Mary Baillie, 1882). It was necessary for any man wishing to handle maternity work to have a wife. The reason for this is unknown. Perhaps he required someone to explain to him the complexities of pregnant women! During his lifetime David delivered



over 3500 babies. Imagine the number of house calls he made, all without a pager or the assistance of a call group.

During David's time such dramatic changes were occurring in medicine that a colleague (Dr. Sheppard, late 1800's) commented,

*"It is possible that the present century will see much greater marvels than the past, and that diseases which are now raging in our midst may be abolished altogether, for most are preventable. Nearly all lethal diseases might be classed under three heads; the Tuberculous, the carcinomatous, and those due to septic germs. It is very possible that these diseases may be abolished altogether, and then the occupation of the doctor will be gone, for people will only die of old age or accident – a few surgeons may be required to treat accidents."*

Unfortunately time has not proven this true. While we have learned to treat many diseases of David's time, our patients have managed to replace them with new conditions.

While David's son and grandson would be very active in medical research and academia – he was content to leave this to others. He was however adamant about furthering his own study and education, and was said to have spent at least one hour each night reading books and journals, as well as regular attendance at Montreal Medico-Chirurgical Society – the journal club he attended until he passed away at the age of ninety.

Fraser B. Gurd, the eldest son of David Gurd, acquired his father's obvious love of medicine. A graduate of McGill 1905, he decided very early in his career that he had a passion for surgery. He quickly became the surgical house officer at the Montreal General Hospital (MGH). In exchange for his work he was "provided with food, lodging, and clean uniforms. The subject of pay was never raised – it was considered an adequate reward to be allowed to serve and learn within the hallowed halls". Again, an example of how little medicine has changed! The residents lived in the hospitals at all times. MGH was the busiest hospital in Canada with an average of 201 patients in hospital/day and 45,000 outpatient visits/year. On top of their in-hospital duties, the residents were also required to share ambulance duty. Because of their close proximity to the harbour, railways, and factories and the lack of occupational health and safety boards, the MGH handled a large volume of traumatic injuries (such as crush injuries, burns, and broken bones). Even at this early stage of his career, Fraser B. noticed the burden created by this steady stream of traumatic injuries and the poor treatment results. He realized that the surgical field of trauma had much to learn. His MGH experience, combined with what he saw during WWI had a large impact on the path Fraser B.'s career and interests would take. Observations he made during his time served in the war formed the basis of techniques he developed in wound care, and principles he would later teach his students for years to come.

In 1914 Fraser B. joined the British Royal Army Medical Corps and served as a surgeon in a British Casualty Clearing station. In the first day of fighting in the Battle of Loos, 13,000 patients were dealt with and in one month 30,000 casualties passed through the casualty

clearing stations. In Fraser's station, ambulance convoys brought approximately 200 wounded men each day. Most of the wounds were treated as major dressings with morphine or nitrous oxide, but many went to the operating room for debridement, amputation, or to control bleeding. Ether and chloroform were the anaesthetics of choice.

At the time the best method to control wound infection was "Carrel" tubes, designed by Dr. Alex Carrel. Tubes placed into deep wounds were used to drain the wound and irrigate it with antiseptic solutions. However, the tubes were ineffective because they needed to be irrigated and dressings changed every two hours, a task for which the manpower was unavailable. Patients arrived at hospitals with horribly infected wounds and clogged tubes. Unsatisfied with the old system, Fraser developed a new technique, BIPP – Bismuth Iodoform Paraffin Paste. The wound was debrided, lined with the BIPP antiseptic paste, packed with gauze, covered with a dry dressing and immobilized with a plaster cast or splint. The BIPP method was so effective, it was not replaced until penicillin was introduced in WWII. In his drive to improve medical treatment, Fraser B also developed exchange of info cards, allowing communication between units and hospitals. The cards were used to transfer patient information, but more importantly to learn how well or how poorly new techniques worked.

Many valuable lessons learned during the war were applied along the evacuation chain. Evacuations were expedited. Serious patients were sent straight through to the CCS without stopping at field stations. This decreased intervals from injury to treatment from 16 to 6 hours. More severe patients were first examined in the OR and given immediate surgery. While X-Rays had been available since 1895 they were not routinely used in initial assessment in order to speed the process up. Also, all wounds began receiving tetanus prophylaxis, a lesson learned too late for Fraser B.'s brother-in-law. Shock was also recognized as very common, occurring in more than half the men arriving. The treatment for shock – aggressive heating with candles, saline and stimulants (i.e.-brandy in the rectum). While blood transfusions were available, they were seldom used and believed to ineffective. This was due to a lack of storage, and the fact that usually only one pint was given to injured men (not enough to make a difference!)

After 3 years of service, Fraser returned home exhausted. He had made significant contributions and learned valuable lessons which he would pass on to his students and colleagues for many years. He continued throughout his career to make significant contributions in fracture treatment, working on the Fracture committee to establish the first guidelines for management. Throughout his career he was also highly involved as an educator - passing on his skill, knowledge and passion to many eager, up and coming surgeons.

Fraser B.'s eldest child Fraser N. was no exception. He too was influenced by his father, learning from his passion and ingenuity and encouraged by his support. Early on Fraser N. decided to pursue a career in medicine and follow in his father's surgical footsteps. On the wards, Fraser N. felt that "making brilliant diagnoses was one thing, but so little could be done for so many patients. However surgeons, they fixed their patients up and sent them on their way". Fraser N. graduated from medical school at a time of extraordinary change; the

end of the depression and the start of WWII. He was lucky enough to have just missed the impending shortage of doctors which came in 1942. In 1942 the government asked all medical schools in Canada to accelerate their courses by removing holidays – shortening the program from 4 years to 3. Imagine HOW AWFUL this must have been for the students!

In 1942 Fraser N. joined WWII and was sent overseas. Like his father, he was thrown into practice, treating more than 250 patients per day. He too recognized what a massive problem shock was. He was very conscious of the lack of basic knowledge regarding shock and how to treat it. Through observation he noted that patients who received too much blood/IV fluids developed edema of the lungs. He wondered how much resuscitation was enough and which conditions were reversible - promising himself to someday investigate his questions and find answers. Like his father, his experiences in WWII would profoundly impact the course his career would take. He wrote to his father about the new “penicillin” treatment that was so effective. Ironically, preparations were so impure and painful, that patients begged to be taken off their lifesaving medications. Fraser N. wrote to his father, “One of the anomalies of this is seen every time one makes rounds. Badly wounded men pleading to be taken off penicillin. Is there such a thing as an unmixed blessing?”

Fraser N. later noted that few major advances were made in surgery during his grandfather and father’s time. Surgeons had focused mainly on technique and left supportive care untouched. He felt it was advances made in supportive care that would dramatically improve surgical results.

On returning home from the war, Fraser N. caught up on technical advancements and the changes in organization that were occurring. Orthopedics was a broadening specialty – just starting to take over care of “fresh” fractures. This move set major changes in motion, by allowing general surgeons to focus more on multiple injuries. It also set the stage for a team approach to patient care, which was starting to emerge in teaching hospitals.

Fraser B. never saw himself as an innovative surgeon. He felt he “was not bold or pioneering, nor an outstanding technician” like his father. He did however see himself making contributions to research and in administrative areas, both of which he successfully accomplished. Research in supportive care became his area of focus and he wrote papers and gave talks to any group who cared to listen. By his retirement, he had completed almost ninety papers dealing with supportive care, treatment, pathophysiology and knowledge of shock. He made invaluable contributions to this field.

Fraser N. was also an excellent educator and made significant contributions to the development of trauma care. In the early 1950’s he was appointed to the first committee on Pre-Post Operative care. In 1960 he was also elected to the committee on Trauma. In this he saw a unique opportunity to combine the two elements for maximal results and effectiveness.

Still active at McGill and MGH, Fraser N. was instrumental in the development of a model Emergency Department at MGH in 1961. The first of its kind with a seven bed reception area, monitoring and resuscitation equipment, and an adjoining x-ray room – the E.D. greatly improved patient care. Meanwhile his committee continued to work tirelessly on the pre-

hospital component of trauma care. Rules were developed for first aid at the scene, the splinting of fractures, moving patients with spinal injuries, and the development of extrication equipment. Heated arguments were held over whether ambulances would be allowed to speed or use sirens and a huge campaign in favor of seatbelts was planned. The work extended from pre-hospital care to emergency departments, where guidelines for treatment were developed.

In 1957 Fraser N. participated in the formation of the Canadian Journal of Surgery and became the assistant editor of the new “Journal of Trauma”. The Journal of Trauma was the first of its kind and gave Fraser N. great satisfaction. It has evolved over time to become a well- respected publication, contributing to the care of the traumatically injured patient.

Fraser N. has been given numerous recognitions and honors for his accomplishments. Among the many recognitions, there is a lecture presented in his honor each year at the annual meeting of the Trauma Association of Canada. He was proud of his accomplishments but still humble. He commented on his recognition by quoting Mark Twain, “I hope no society will be named for me while I am still alive, for I might at some time do something to cause the members to regret having given me the honor”. That thought apparently kept him out of mischief until his passing in 1995.

We have many reasons to thank the Gurdy - their contributions have advanced the care and treatment of the traumatically injured. We can also thank them for their dedication, their passion, and their obvious love of medicine. It is a reminder to us of why we want to practice medicine. While patients needs and treatments may change - we can be assured that the fundamentals that draw us to our profession will remain constant.

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# **A SCIENTIST'S FIB OR A SYSTEM'S FOLLY? A TALE OF COCKROACHES, NATIONAL PRIDE, AND CANCER-CAUSING WORMS**

By

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## **ABSTRACT**

**Johannes Andreas Grib Fibiger was an accomplished scientist, a professor of medicine, a representative of the academic community, and an all around good guy. As the crowning glory to an illustrious career he was awarded the Nobel prize for discovering a worm that caused gastric cancer in a rat model. Curious? Yes indeed! Subsequently, the validity of Fibiger's work was called into question, and history painted him as a fool. This presentation takes a look at the validity of his work, Fibiger's general goodness, and the circumstances surrounding his publication and acquisition of the Nobel prize.**

Johannes Andreas Grib Fibiger was an accomplished scientist, a professor of medicine, international spokesman, and Nobel laureate. His life was a model of commitment and dedication, and his legacy most worthy of historical mention. Fibiger was born in Silkeborg, Denmark to a middle class family. His father was a doctor and his mother a writer. In 1890 he earned his MD at Copenhagen University and later completed his doctoral thesis on the bacteriology of Diphtheria. The British Medical Journal later heralded this publication as the earliest study in which random allocation was used and emphasized as a pivotal methodological principle (Hrobjartsson, 1998). His work with Diphtheria marked a pioneering improvement in methodology, combining a large patient population with strict controls, guidelines and reporting; it was a milestone in the history of scientific methodology. Fibiger later established himself as a prominent figure in many other aspects of the academic community.



Johannes Fibiger 1867-1928

He served as president of the Danish Medical Society and Cancer Commission, and acted as a founder, member and co-editor of many academic journals. Fibiger was also a member of the international commission for intellectual cooperation and was well recognized in the international academic community. Finally, in 1926 he was awarded the crowning glory of his career - the Nobel Prize.

The Nobel Prize was designated to be awarded to the individual who conferred “the greatest benefit on mankind” or made “the most important discovery within the domain of physiology or medicine.” For his discovery of the involvement of the nematode *Spiroptera* in causing cancer, Johannes Fibiger was awarded the Nobel Prize.

Fibiger first became interested in this area when he noticed the presence of nematodes in the stomachs of three wild rats, while studying gastric papillomas. This observation led him to suspect that these worms were causing the gastric cancers he was studying. A literature review showed that a similar nematode was known to infect the common cockroach.

To further investigate this relationship Fibiger examined 1000 wild rats but found no gastric papillomas. Subsequently, in a sugar refinery near the institute 61 rats were captured, of these 40 had nematodes in the stomach and 7 of those infected had growths determined to be neoplastic. Interestingly, the cockroaches infesting this particular refinery were noted to carry the nematode *Spiroptera* in the larval stage. These observations led Fibiger to believe that a causal relationship existed between the cockroach parasites and the gastric carcinoma in rats (Modlin, 2001). Feeding the rats adult nematodes did not result in infestation. However, in 1919, Fibiger demonstrated that the cockroaches were an intermediary host by feeding the rats infected cockroaches in a laboratory setting. The rats, which were fed infected cockroaches, soon became infested with the nematode parasites, and the incidence of gastric cancers rose relative to these levels of infestation. Fibiger concluded that there existed a "proportional relationship" between the numbers of parasites carried by the rodents and tumor incidence. He then postulated the relationship would also hold true in human systems stating, “Helminthes... must be assumed to play a greater or lesser role in the development of tumors and cancers in humans (Fibiger, 1926).” Although his work was not without critics, it was widely accepted and was met with wide praise from the academic community. In 1928 Fibiger died, and his work died with him.

Until 1936, when Passey and colleagues reported that Fibiger was probably misinterpreting the “cancers” observed in his subjects. It seems that a deficiency in Vitamin A produces lesions identical to those observed by Fibiger and, furthermore, these lesions were not cancers but rather metaplastic lesions. The photomicrographs produced by Passey were quite similar to Fibiger’s, which were reinterpreted as excellent examples of metaplasia. It seems the relationship observed by Fibiger was corollary rather than causative and the result of the infestation was not cancer.

His work was again called into question in 1952 by Hitchcock and Bell who attempted to replicate his results using rats fed diets adequate in vitamin A (Hitchcock, 1952). Their conclusion was that a combination of nematode infestation and vitamin A deficiency led to the development of gastric metaplasias, mistaken by Fibiger as carcinomas. Further, a more

Careful look at Fibiger's work showed significant methodological oversights, such as the absence of essential control groups. Although the practice of using concurrent controlled trials postdated Fibiger's work, this is strange as Fibiger is heralded as being the first to implement randomized controlled studies.

How did these mistakes happen? And how did the Nobel committee miss these errors. Perhaps Fibiger was crooked. Maybe the success went to his head, allowing methodologic oversight. Was he influenced by the thoughts of the day? Perhaps his peers and the Nobel committee were blinded by his big name, star status. It is unlikely that Fibiger's errors were a deliberate attempt to unjustly garner the scientific community's approval, and the Nobel Prize - especially given his significant involvement and numerous other contributions. It is possible that his past successes led to complacency and allowed a more relaxed methodology open to error. Furthermore, Fibiger was surely influenced by the scientific thought of the day. Although this may now sound surprising, similar discoveries had been made which demonstrated a relationship between a related parasite and cancer of the urinary tract and bladder. Strangely these discoveries still hold true.

Regardless of how these errors were allowed to take place, admiration of Fibiger's work seemed universal. In one influential textbook on neoplastic disease his paper was described as a "brilliant study" and ultimately it was recognized with a Nobel Prize in 1926. At the ceremony the presenter expressed unrestrained admiration for his work.

*"Fibiger was the first of these to succeed in lifting with a sure hand a corner of the veil which hid from us the etiology of this disease. ...[His] work has been the greatest contribution to experimental medicine in our generation. He has built into the growing structure of truth something outstanding, something immortal!"*

Such adulation is not the norm in such presentations. In fact, this praise, bordering reverence, contrasts quite sharply with the comments made by the committee on awarding Banting and Macleod the Nobel Prize for the discovery of insulin.

*"We must not imagine that insulin is a cure for diabetes. ...It has also been said that its discoverer was in a preeminent degree favored by lucky circumstances."*

Remember cancer was a high profile disease, and little was known about its etiology or scope. The already accomplished Johannes Fibiger may have been over enthusiastic, attempting to document something "lasting, and immortal." His errors in method may have been overlooked because of his status in the academic community and, furthermore, his claims would have been easily accepted as the prevailing thought led people to expect worms to cause cancer.

So Fibiger has risen and fallen, and, generally, this is where the medical historian has left him. Granted his fumbings and erroneous conclusions may seem glaring in light of our current understanding. However, Fibiger's true contributions to the scientific community

must not be forgotten. His wide spread involvement and, specifically, his contribution to methodology are worthy of respect. Although he was wrong in his conclusions concerning *Spiroptera*, he may not have been as far off as it first seems.

Some fifty years after Fibiger was awarded the Nobel Prize Barry Marshall began his work examining the relationship between *Helicobacter Pylori* and gastric ulcers. Although he was met considerable resistance his work eventually established the causal relationship between *Helicobacter Pylori* and gastric ulcers. At the time, current thought held that the stomach was a sterile environment and the idea of an infectious cause for stomach ulcerations seemed absurd. Eventually Marshall fulfilled Koch's criteria by inoculating himself with the bacteria, and later regrowing cultures from his newly infected stomach. Further study has supported this work showing *Helicobacter Pylori* to be responsible for causing gastric ulcers. In fact, *Helicobacter* has also recently been implicated in carcinogenesis. The infectious model, which Fibiger generated to explain gastric carcinomas, although flawed, was not as misguided as it first appeared.

Fibiger was a Scandinavian who was recognized for being clever rather than for a specific discovery. He was an accomplished scientist, a teacher and a pioneer in many aspects. His role in forming the basis for the randomized controlled trial is still respected today. Truly Fibiger contributed significantly to humanity and perhaps it was this contribution that the Nobel committee sought to recognize. To borrow the words of one of Johannes Fibiger's contemporaries, "[he] may have been barking up the wrong tree, but he was still a Great Dane!"

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# **ASA A.S.A.P. ASPIRIN: THE MAKING OF A MODERN DAY PANACEA**

**By**

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## **ABSTRACT**

**The idea of a cure-all medicine is not novel and in fact dates back to ancient times. Many different cultures have made use of medicinal products that they have dubbed cure-alls. What distinguish the history of aspirin (ASA) are the myriad political and social roadblocks that have stood in opposition to its ascent towards greatness. The original commercial use of Aspirin came about because stomach irritation occurred in many using salicylic acid. With the end of World War II, the fate of the Bayer Company became uncertain as did its mainstay, aspirin. The increasing popularity of Aspirin was caught up in the ensuing pharmacological competition that was characteristic at the time. Despite this, the Sterling Co. of the United States was able to continue research and development of this now recognized “penny drug.” The potential of this drug in today’s society has lead to an explosive research field and generated much interest in scientific and public circles. In fact, many consider ASA to be a true panacea. It has been beneficial in both alleviating and preventing many known ailments and diseases; two examples of which are heart attacks and colon cancer. In spite of its tortuous road to fame, aspirin has continued to rise in popularity in recent years due to the discovery of new, more significant uses.**

A drug both like and unlike all others; a paradox that typifies the significance of the study of Aspirin and its history. Medically speaking, Aspirin is distinguished from most other drugs by the ever-growing list of new discoveries being made about it, not to mention the continual use of Aspirin for its anti-inflammatory benefits. However, Aspirin is not without disadvantages and thus shares commonality with so many other drugs, past, present, and undoubtedly future as well. With regard to history, Aspirin is demarcated by the fact that few drugs have as rich a history. With so much to learn from Aspirin’s history and so much more to discover, perhaps the little white pills that stock so many medicine cabinets mean so much more than our first impression bears.

So far has aspirin come from Hippocrates's crude use of the bark of willow trees to treat fevers, carrying with it the heart of a multimillion-dollar company. As Aspirin goes, Bayer goes; the rise, fall, and resurrection of one of today's most powerful drug companies reminds us how temperamental life can be. In fact this temperament accounts for the bizarre happenings that define the history of Aspirin and explain its convoluted ascent to everything it that it has come to be.

The history of Aspirin begins with the Friedrich and Bayer Company, a small dye company located on the banks of Wupper River in Germany. Having met failure many times over in the cut-throat business of dye manufacturing, Friedrich Bayer struggled to make ends meet. At that time, he had no idea about the intensity of future pharmaceutical company competition; nor was he aware that the company that bore his name would one day reach the pinnacle of success in drug manufacturing and marketing. In fact, he did not live to see his company produce a single pharmaceutical. He died in 1880 and left his company to his son-in-law, Carl Rumpff. In September 1884, Carl Duisberg became an employee of the Friedrich and Bayer Company. In the industrial revolution the exploration of science and the use of automation predominated in all of business and in the minds of all ambitious industrialists. In this spirit, Rumpff and Duisberg found a new, more profitable application for the coal-tar byproducts generated in dye synthesis. The Friedrich and Bayer Company entered the world of drug manufacturing. So began the legacy of the Bayer Company and very soon afterward of Aspirin as well.

Under the direction of Carl Duisberg, the Friedrich and Bayer Company, renamed *Farbenfabriken Bayer*, grew immensely. Having a fundamental understanding of how to meld science and business as well as an ambition to succeed, Duisberg made Bayer what it is today, largely on Aspirin. Duisberg focussed the resources of the Friedrich and Bayer Company on pharmaceutical production and research. One of the company's young research chemists, Dr. Felix Hoffmann produced the marvellous fruit of this endeavor. In 1897, he synthesized a variant form of salicylic acid (a well-known analgesic that caused severe stomach irritation and was derived from a willow bark substance, salicin) first documented by a French chemist in 1853 and then later purified by a German scientist. The product was acetylsalicylic acid (ASA), a chemically modified version of salicylic acid that provided the analgesia with less stomach irritation. Original reservations about the effects of ASA on the heart prevented its widespread use; however, persistent provision of ASA to local physicians returned nothing but praise and optimistic results. ASA proved to be an effective drug and a coveted commodity. Duisberg's marriage of business and science explained his ability to exploit this chemical product for profit and established the foundation of the Bayer name and its synonymous association with Aspirin. The simplicity and effectiveness of Duisberg's ploy made him a pioneer in the industrial revolution in Germany and the pharmaceutical industry as a whole. Duisberg's idea was to inundate physicians with samples of his ASA, under the brand name Aspirin (coined because the product was the *acetylated* form of salicylic acid, ultimately derived from the *spirea* plant). Aspirin was thus one of the first drugs to be provided to physicians for the purpose of clinical use and feedback; pharmaceutical companies today may have learned something from this early example. German physicians, pleased with the effects of the drug, wrote prescriptions to pharmacies for "Aspirin." Knowing that the physicians were referring to ASA was irrelevant to the pharmacists who had no choice but to sell the patient the more expensive Aspirin rather than the cheaper generic ASA. Friedrich Bayer's company was founded on Aspirin, as much on the name as the product.

The turn of the century saw Bayer expand its wares and its supremacy from Germany throughout the world. The keys to the success of the establishment of Bayer authority internationally were patents and trademarks. In every country where Bayer sold its products

in it obtained a patent that named Bayer as the only company that could legally produce and purify ASA using Hoffmann's method. Of course the use of patents by pharmaceutical companies today is common practice and market monopolies are a given. For better or worse (better for the company and worse for the consumer), Duisberg's Bayer company is a prime example of the profitable, but ominous employment of patents in the drug trade. It is one of the first illustrations of how the law could be used to subject the public to a non-competitive market that served only to increase the profitability of the company. Bayer's sharp use of legal measures to ensure market domination did not, however, end with the patents that it obtained. Knowing full well that the patents could help Bayer only as long as they lasted, Duisberg had to conceive a way to ensure Bayer's success after patent expiry. The answer was trademarks. By acquiring trademarks to the Aspirin name, Bayer secured its place in the market for years to come; it now controlled the use of the word Aspirin and therefore any mental associations that accompanied it. Aspirin belonged to Bayer and no one could take that away, at least in the traditional sense.

At the time that Duisberg had constructed the new Bayer headquarters in Leverkusen, the land of opportunity was beckoning. The United States of America was expanding at an alarming rate; and business opportunities abounded. As might be expected, a surge of migration to America began and Aspirin quickly followed. Duisberg set up an American branch of Bayer in New York called Farbenfabriken of Elberfeld, later renamed the Bayer Company. To avoid having legal improprieties from one major branch affecting the other, the American office was set up as an independent company, although it was still in fact under Leverkusen control. Unknowingly, Farbenfabriken Bayer had made itself vulnerable as a result of this legal maneuver because the patents and trademarks of the Aspirin and Bayer names in the USA and many other countries were legally owned by the American division, the Bayer Company. At the onset of World War I, Germany was at war while the USA abstained under the policy of isolationism. Unfortunately for Bayer, American involvement was inevitable, as was the purging of German owned businesses in America by the Office of the Alien Property Custodian. Despite Bayer's best effort to hide its German ties, the Bayer Company was eventually seized by the government and auctioned off to the highest American bidder, ironically on the day after the Great War ended, November 12, 1918. The premise of the events was simple: to the victor go the spoils.

As the Allied forces celebrated their triumph over the fallen German empire, so too did American entrepreneurs as they awaited the auctioning of one of the most sought after American companies like vultures circling wounded prey. At one time Bayer Aspirin stood for the gold standard of German science and business etiquette, but at the end of the war it only symbolized the rise of American power over the German cause, a theme that resonated in all facets of postwar life. With that notion reverberating throughout the world, Sterling Products, Inc. stood atop the Bayer Company as the dust settled following the denouement of the auction. Upon acquisition of the Bayer Company, Sterling received not only a factory in Rensselaer, but with it the patents and trademarks of Aspirin that were owned by the Bayer Company, as well as the rights to Bayer's identity and its primal symbol, the Bayer Cross. The stage was set for one of the most bizarre industrial battles in history, Bayer versus Bayer. The issue was complex and bewildering. In existence were two separate companies selling the same product under the same brand and company name. Needless to say, Farbenfabriken

Bayer (then part of a conglomeration of German dye-based businesses called I.G. Farben) battled Sterling's Bayer Company on all fronts for the right to sell ASA as Aspirin in various countries throughout the world. In an unprecedented turn of events, the Aspirin patents and trademarks that Duisberg had fought so hard to acquire for the purpose of protecting his assets against imposters were now turned against him. Fate, however, was not eternally opposed to Duisberg or the German people. It seemed that much could be said for German chemical engineering at the time, so much in fact that it became apparent to the Sterling Products managers that German employees were the only ones who had the knowledge needed to operate the machinery in the Rensselaer factory. Hence, an opportunity for redemption, at least in part, was presented to Duisberg and truth was found in the idea that a Bayer company divided against its self cannot stand.

As a result of a contract signed in 1920, the Bayer Company and I.G. Farben agreed that the lucrative Latin American Aspirin market would be non-competitive with the profits shared between the two companies, 75-25 in favor of the Leverkusen company. Further contracts in 1923 stated that the Farbenfabriken Bayer would regain exclusive rights to use the Bayer Cross in all countries in the world except the USA, Canada, Australia, and South Africa. In Great Britain, the two companies would share Aspirin profits from a jointly operated company. This arrangement, not without its flaws, lasted some twenty years and was more or less beneficial to both parties. However, all good things come to an end and this prosperous relationship was no exception. With the rise of Nazi power in Germany, the fate of Aspirin was once again to reflect the political paranoia characteristic of nations at war.

Realizing the importance of the Latin American Aspirin market to Farbenfabriken Bayer and Hitler's influence on all aspects of German life, including pharmaceutical manufacturing, the United States was intent on annihilating any American support of the German Bayer company. Despite Sterling's best effort, it could not conceal its connection with Farbenfabriken Bayer, which was eventually exposed due to the 50% German ownership of Sterling's manufacturing division. Claiming that Sterling's cooperation with Farbenfabriken Bayer only served to fuel the German war effort financially, the American Justice Department investigated Sterling. The investigation determined that the only way Sterling could prove its independence of I.G. Farben would be to abolish any past agreements between them. The head Sterling executive, William Weiss was forced to resign after failing to convince Farbenfabriken Bayer to relinquish their past contracts. Under new management, Sterling Products, Inc. circumvented its contract obligations by competing with Bayer Aspirin using an Aspirin imitation called Meajoral. Extensive advertising in Latin America, combined with difficulties in distributing goods, experienced by I. G. Farben as a result of Allied blockades, allowed Sterling to capture most of the analgesic market in Latin America by the end of the war. All the while, I.G. Farben was not left unaffected during the Second World War. As ordered by Hitler, Jewish workers were persecuted and factory supervisors were made privy to the concentration camps that Hitler had constructed. Consequently, many I.G. Farben workers were tried for war crimes after the fall of Hitler and the company was thereafter broken up, making Sterling's takeover of the South American Aspirin market relatively easy despite the prevalence of the Bayer Aspirin name.

Sterling Products' celebration would be short-lived however. The patent on ASA in the USA had long since expired and the world's single greatest market for acetylsalicylic acid was open to competition. Furthermore, in the USA the trademark for Aspirin had been legally lost for quite some time because of the general public's correlating of Aspirin with ASA, not with a Bayer product. "Bayer aspirin" in the USA now faced a daunting new challenge; thus began the marketing wars. In light of this free aspirin market the era of commercialism commenced; manufacturers targeted the general public with an array of advertisements from all fronts. Owing largely to the development of television, there were now several media through which companies could reach the minds of potential consumers. Two major ASA producing competitors, Anacin and Bufferin, took advantage of the Bayer Company's passive postwar campaigning by staging vigorous attacks against Bayer aspirin, claiming that their products (chemically modified versions of ASA) were more effective. As if this wasn't enough, Sterling Products still had the issue of Bayer's "split personality" to contend with, as the once proud German company recomposed itself after facing significant WWII repercussions dealt out by the Allies. In 1976 Sterling's Bayer Company and Bayer AG, the German company coming out of the broken I.G. Farben, finally reached a court determined settlement. Citing the fact that the 1923 contracts were still valid and that Sterling had unintentionally misrepresented itself as the source of the goods it sold, Bayer AG was given the right to use the Bayer Cross with "Made in Germany" printed below and eventually even directly competed with Sterling by selling aspirin in the United States under the name Bayer USA. It was not until 1994 that the dispute was finally put to rest by Bayer AG's purchase of Sterling's Bayer trademarks. The rights to the Bayer name and the use of the Bayer Cross were finally in the hands of their rightful proprietors. Two Bayer companies had become one once more. Although international branches of this time-tested establishment were given various names in the coming years, central control from Germany remained constant.

Despite the continual development of Bayer-Bayer relations, the fate of Aspirin throughout much of the latter part of the twentieth century was quite uncertain. Not since the days that Farbenfabriken Bayer almost overlooked the potential of acetylsalicylic acid as a drug had Aspirin faced such dire straits. By the 1950s, the Bayer Company's stronghold on aspirin in the USA was dwindling, as other ASA producing companies claimed greater percentages of the market. They were successful in beating Bayer in the pain relief game for a period of time; however, they too were eventually overcome by an unseen rival, Tylenol. Tylenol, an acetaminophen, rapidly usurped much of the analgesic market from aspirin compounds from the 1950s to early in the 1980s. Aspirin, like the dying flame of a once raging inferno, had suffocated its own demographic by futile competition between multiple companies selling essentially the same substance. Tylenol had only to claim what aspirin had given up to seal its fate. Fortunately for Bayer stockholders, the story does not end here. In October 1985, the U.S. Secretary of Health and Human Services Margaret Heckler, with a Bayer aspirin bottle in hand, announced at a press conference that evidence showed that an aspirin a day could prevent the recurrence of a second heart attack. Aspirin did not have a negative effect on the heart after all, as Farbenfabriken Bayer scientists had first suspected; the results of the research showed the contrary to be true, aspirin is good for the heart.

Like the Phoenix rising from the ashes, aspirin rose from the brink of extinction once again. Fittingly, it did so on the back of the company that gave it life so many years ago; based on a

discovery that exactly contradicted the fears that burdened acetylsalicylic acid production in the past. News of aspirin's newfound value benefited all aspirin companies, but none so much as Bayer, the only company selling pure aspirin. Furthermore, the existence of formidable competitors did not dissociate aspirin from the Bayer name, as most of the American public associated aspirin with Bayer, despite the fact that the trademark was no longer legally valid. For this reason, aspirin competitors were cautious of making claims that their products did in fact primarily contain aspirin, fearing unwitting promotion of Bayer products. Upon the discovery of aspirin's benefit in the prevention of heart disease, Anacin began to advertise that it was in fact aspirin too; Bayer had won. Aspirin was here to stay.

The history of aspirin is the story of a drug, a product, its chief manufacturer and the triumphs and hardships they endured together. The story epitomizes the struggle for power that characterizes all of business and life. Thematically, the story of aspirin conveys all the elements of human nature that are the basis of any good tale: greed, suspicion, deception, and conflict. The course of Bayer Aspirin has illustrated the interconnection of world events in the twentieth century; a notion that takes on increasing significance as our world makes further commitments to a global community. Accordingly, Aspirin's past has reflected many of the major paradigms of the 1900's, including the ideologies characteristic of the industrial revolution as well as those perilous wartime mentalities. That being stated, perhaps the greatest lesson that can be taken from the aspirin timeline has less to do with what we already know about aspirin and more to do with what we can still learn about it.

The pandemonium surrounding aspirin, stoked by Bayer Corporation, has today become so widespread that researchers and physicians alike have been forced to test its limits as a panacea. Aspirin was initially designed to help alleviate pain and fever and became a customary treatment for patients in early hospitals. Originally derived from nature and later developed by science, aspirin was fated for grander employment.

Despite its long history, aspirin's mode of action was not elucidated until the last third of the twentieth century. Largely due to research conducted in the United States, aspirin administration was linked to the reduction of products derived from arachidonic acid (AA), an intra-membranous fatty acid. At the time of this revelation, it was a well-known fact that arachidonic acid was a precursor in the cyclo-oxygenase system that produced two very potent, omnipresent products: prostaglandins (PG) and thromboxane A<sub>2</sub> (TXA<sub>2</sub>). PG<sub>E2</sub>, a subset of the prostaglandins, is responsible for the initiation of the inflammatory response by eliciting vasodilatory effects and producing edema with its associated pain. It was first found that aspirin acts by inhibiting the production of PG<sub>E2</sub> via non-selectively binding to the cyclo-oxygenase enzymes COX-1 and 2. This binding results in enzyme deactivation and consequently no PG<sub>E2</sub> production. In addition to its PG<sub>E2</sub>-related anti-inflammatory effects it was observed that aspirin also helped to alleviate any accompanying pyretic effects, presumably through the same mechanism. The second major role of aspirin, discovered not long after the first, was aspirin's anti-thrombotic effect. TXA<sub>2</sub>, a platelet-coagulating factor, is prevented from being produced because it is ultimately derived from arachidonic acid.

A heart attack is commonly the result of a slow build-up of material, usually scar tissue, cholesterol, calcium, and other substances that may solidify over time. It is a condition that is often associated with unhealthy diets, health risk behaviors, and a lack of exercise. The

accumulation of material, called an atheromatous plaque, in the small arteries encircling the heart can significantly impair cardiac blood flow, the effects of which are manifested as angina, a heart attack, or congestive heart failure. In a time of economic prosperity and reasonable postwar political security, the 1950's and 1960's saw sedentary lifestyles become a staple in American society. Such an existence naturally led to an increase in the occurrence of heart attacks and hence helped engrain aspirin's place in history by making the search for improved treatment and longevity a medical priority.

A heart attack (myocardial infarction) occurs when a large enough clot blocks the flow of blood in one or more of the narrowed coronary arteries, cutting off oxygen supply to the heart. An understanding of this concept allowed scientists of just one generation ago to explain the correlation between aspirin usage and a decreased incidence of heart disease that was first noticed by Dr. Lawrence Craven some thirty years before, in 1948. Clot formation was "at the heart" of heart disease and therein lay the secret of aspirin's wonders. The clot formation process initially involved the cyclo-oxygenase system and therefore could be impeded if aspirin was administered prior to the attack. At this exciting time in the life of aspirin, a landmark study appeared in the *New England Journal of Medicine* in 1988. In a double-blind experiment one group consumed a 5g tablet of aspirin a day while the other was given a placebo. The ASA caused a reduction in the risk of a myocardial infarction. This clinically relevant finding led doctors to prescribe aspirin widely in the hope that heart attacks may be prevented. Preventing a second heart attack became as critical as avoiding the first. The mechanism that made all of this possible was quite simple once aspirin's mode of action was elucidated; aspirin acts by inhibiting the formation of TXA<sub>2</sub>, which in turn results in a reduction in platelet aggregation, ultimately preventing clot formation. These findings did not mean that one could throw caution to the wind, but rather, those individuals who are genetically predisposed to certain coronary obstructions could use aspirin as an effective tool to complement other preventive measures.

Throughout this phase of the history of aspirin, regular ASA consumption became the standard practice in second heart attack prevention. It was well documented and well publicized that the use of aspirin (5g) was enough to reduce the incidence of a second heart attack by more than 40%. It was even suggested that the adoption of an "aspirin a day" motto could prevent hundreds of thousands of myocardial infarctions in the United States alone. In addition to this, analogous applications of aspirin treatment for the alleviation of angina pectoris, strokes, and certain cerebrovascular diseases, characterized by reduced blood flow to the brain, have evolved. However, it was the strong belief in aspirin's ability to prevent second heart attacks that elevated its status beyond that which anyone could have possibly foreseen. Aspirin once again became an integral component of medicine cabinets around the world.

From the moment aspirin's anti-thrombotic effects were revealed it became only a matter of time until it would be used as a tool to combat heart attacks as they occurred. A currently used anti-coagulation drug known as streptokinase, selling for about \$200 USD per dose, has the ability to reduce the mortality rate by about 25%. More startling was streptokinase in combination with intravenous aspirin mortality rates were further reduced to 50%. This truly

remarkable synergistic quality is why the August 1988 issue of *Newsweek* labeled aspirin as the “miracle drug.”

With life at its best, heart disease was at its worst. At the time of aspirin’s rebirth, heart attacks, whether initial or recurrent, were one of North America’s leading diseases. In this respect, not much has changed in the last twenty years; statistically, over one million individuals will suffer a heart attack this year. In light of these facts, one may say the grand-scale potential of aspirin was realized in the past as clearly as it is today. The seemingly timeless nature of heart-related ailments is therefore responsible for the heights to which aspirin has aspired.

However, the universal use of aspirin has not been without repercussions; one example of this is the increased incidence of cerebral hemorrhages. The use of aspirin has been justified consequently, by understanding that 10 lives are saved by preventive measures for every one cerebral hemorrhage. At various times in recent history, aspirin has been used so widely that people have often forgotten that it is a drug and should be taken with caution, as any other drug would be. Over-consumption of aspirin has been implicated in the formation of ulcers in the gastrointestinal tract. However, this finding was not substantiated. Upon investigating the reasons for taking aspirin, researchers found that a significant number of patients initially took analgesics for gastrointestinal symptoms, making the determination of causation difficult. The “chicken or egg” debate is a cliché that adequately describes the relationship between aspirin consumption and gastrointestinal ulcers.

Bar-none, the most infamous disease associated with aspirin consumption affects children. Reye’s syndrome is a neurological disorder of unknown etiology complicated by hepatic dysfunction and affecting children predominantly. It was first officially associated with aspirin consumption in 1963 by an Australian physician, Dr. Reye, who described it as a clinical pathological entity. Symptoms can vary from vomiting to hepatomegaly with elevated transaminase levels. This multifactorial disease has been compared to salicylate toxicity, a similar condition characterized by acidosis, an increase in ammonia excretion, clotting disorders, and raised transaminases. The obvious chemical similarities between ASA and salicylate proved to be a very helpful in deciphering the source of this tragic aspirin side effect.

Outside of the excitement surrounding aspirin’s emerging cardiac benefits and the unfortunate consequences that followed, aspirin was implicated in a wide variety of other medical problems. For example, before aspirin was linked to heart-related issues, dating back to 1897 when Dr. Felix Hoffmann first synthesized ASA for the purpose of helping his arthritic father, the use of aspirin for relief of joint pain was understood. Currently, it is commonly used to reduce the swelling and pain associated with arthritis, a debilitating disease that offers to sufferers two bleak choices: tolerance of “intolerable pain” or avoidance of the pain by abandonment of use of the joint. This ultimately results in muscle wasting, which can lead to functional disability. Arthritis is irreversible, but aspirin has shown that its affects can be mitigated. Aspirin belongs to a group of drugs known as NSAIDS (non-steroidal-anti-inflammatory-drugs), which cost less than most steroidal “cures” for arthritis. Arthritis is not reversible; therefore, a person with arthritis must take medication for a long



time. Aspirin's relatively low cost is one historical reason why aspirin's use to treat arthritis has persisted.

In addition to this ancestral use of aspirin, research conducted concurrent to the exploration of aspirin's effect on the heart revealed further benefits, some of which are still under investigation. Although not conclusive, evidence published in the *Journal of the National Cancer Institute* in 1991 showed that aspirin may help prevent colon and rectal cancer. Subsequent data from other research groups suggest that aspirin may be effective in the treatment of dementia and pregnancy-induced hypertension.

Aspirin research continues today, with more findings revealing additional ways in which it can benefit humanity. One such way may be its use to decrease the incidence of senility and diabetic cataracts. This correlation was noted when scientists discovered that products derived from arachidonic acid have the ability to speed up cataract formation. Aspirin has the ability to inhibit the metabolism of arachidonic acid and thus slow the onset of cataracts. Aspirin has also been shown to provide beneficial effects to those suffering from migraines. The research process is ongoing, but preliminary results indicate some common underlying mechanism is responsible.

With the above benefits, the additional uncovered gains that seem so inevitable, and the affluent history of aspirin, it is no wonder that aspirin has risen to become a pillar of the pharmaceutical industry. The potential of this one drug is rivalled by no other. It has the capacity to influence not only how long we live, but also how healthy we are. Changing our quality of life and challenging the very concept of human mortality, aspirin certainly makes an impressive bid for the title of a modern day panacea. As experience has taught us however, aspirin is not outside the realm of all other drugs; it is not perfect; it is simply very good at all it does.

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# ON THE PHILOSOPHICAL AND HISTORICAL IMPLICATIONS OF THE INFAMOUS TUSKEGEE SYPHILIS TRIALS

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## ABSTRACT

As in other professions, the history of medicine is no stranger to abuses and transgressions in ethics. The image of the unfortunate prehistoric "patient" struggling against the hold of the sorcerer's assistants as the sorcerer trephines his skull in the hopes of releasing the evil spirits of possession, is as etched in the mind of the student of medical history as it is on the walls used to record the barbaric event. Similarly, the expeditions of the anatomists of the Roman era into the bodies of former patients, some of who may not have been dead yet, were certainly not crowning moments in the history of medicine. Or, consider the example of the great William Beaumont. After saving the life of Alexi St. Martin from an abdominal bullet wound in 1822, Beaumont enlisted the help of the English Constabulary in "persuading" St. Martin to participate in numerous experiments examining the digestive juices. The twentieth century may have proven to see the darkest days in the history of medicine. The world witnessed ethical abuses such as those committed by the Nazi physicians during World War II, or the violation of the rights of non-consenting syphilis patients in Tuskegee, Alabama by physicians aiming to study the progression of the disease in the African American population. Upon a historical examination of these cases, the concepts of subjectivity and relativism are central in understanding and explaining possible reasons for such historic ethical and professional transgressions. The overall goals are to explore what ethical standards historically govern the practice of medicine, and whether a relativistic ethical standard is adhered to while universal (unknown?) standards are ignored in times of ethical transgressions. An ultimate goal is to identify potential universal ethical standards that the medical professional should always respect (universal human rights for example).

*"To judge rightly on the present we must oppose it to the past; for all judgment is comparative, and of the future nothing can be known....The present state of things is the consequence of the former, and it is natural to inquire what were the sources of the good that we enjoy, or the evil that we suffer. If we act only for ourselves, to neglect the study of history is not prudent; if we are entrusted with the care of others it is not just."*

*Rasselas, Prince of Abissinia*  
Samuel Johnson (1783)

*The body's mischiefs, as Plato proves, proceed from the soul: and if  
the mind be not first satisfied, the body can never be cured.*

*The Anatomy of Melancholy*

Robert Burton (1621)

Cited in *The Cunning Man*

Robertson Davies (1994)

## Introduction

As in other professions, the history of medical arts is no stranger to abuses and transgressions in ethics. The image of the unfortunate prehistoric "patient" struggling against the hold of the sorcerer's assistants as the sorcerer trephines his skull in the hopes of releasing the evil spirits of possession, is as etched in the mind of the student of medical history as it is on the walls used to record the barbaric event. Similarly, the expeditions of the anatomists of the Roman era into the bodies of former patients, some of whom may not have been dead yet, were arguably not crowning moments in the history of medicine. Or, consider the example of the great William Beaumont. After saving the life of Alexi St. Martin from an abdominal bullet wound in 1822, Beaumont enlisted the help of the English Constabulary in "persuading" St. Martin to participate in numerous experiments examining the digestive juices. Finally, the twentieth century may prove to have been the darkest days in the history of medicine. The world had not yet seen ethical abuses such as those committed by the Nazi physicians during World War II.

It can be argued that any profession which operates under the scientific principles of trial and error is prone to errors such as is described above. However, since the time of the ancient Egyptians, medical professionals have taken it upon themselves to prescribe guidelines that are to be followed when dealing with the ethical issues of the day. The most famous and widely adhered to example of such a prescription is contained within the Hippocratic Oath. The Hippocratic Oath is attributed to the collection of documents known as the Hippocratic Writings, some of which are attributed to the fifth century B.C. Greek physician, Hippocrates. The version of the Hippocratic Oath discussed herein is thought to have been written by the philosophical sect known as the Pythagoreans in the late fourth century, B.C. For thousands of years, the Hippocratic Oath has been the code of ethics for physicians. It proclaims the highest aspirations of physicians as well as the absolute prohibitions under which physicians must practice. There are two sets of duties promulgated: (1) duties to the patient and (2) duties to the other members of the guild of medicine. Among the many rules found in the oath, the statement of the physician's obligation to help and to not harm the patient is crucial to the ethical discussions in this essay:

*I swear by Apollo Physician and Asclepius and Hygieia and Panaceaia and all  
the gods and goddesses, making them my witness, that I will fulfill according  
to my ability and judgment this oath and this covenant:*

*To hold him who has taught me this art as equal to my parents and to live  
my life in partnership with him, and if he is in need of money to give him a  
share of mine and to regard his offspring as equal to my brothers in male*

*lineage and to teach them this art - if they desire to learn it - without fee and covenant; to give a share of precepts and oral instruction and all other learning to my sons and to the sons of him who instructed me and to pupils who have signed the covenant and have taken an oath according to the medical law, but to no one else.*

*I will apply dietetic measures for the benefit of the sick according to my ability and judgment; I will keep them from harm and injustice.*

*I will neither give a deadly drug to anybody if asked for it, nor will I make a suggestion to this effect. Similarly I will not give to a woman an abortive remedy. In purity and holiness I will guard my life and my art.*

*I will not use the knife, not even from sufferers of stone, but will withdraw in favor of such men as are engaged in this work.*

*Whatever houses I may visit, I will come for the benefit of the sick, remaining free of all intentional injustice, of all mischief and in particular of sexual relations with both female and male persons, be the free or slaves.*

*What I may see or hear in the course of treatment or even outside of the treatment in regard to the life of men, which on no account one must spread abroad, I will keep to myself holding such things shameful to be spoken about.*

*If I fulfill this oath and do not violate it, may it be granted to me to enjoy life and art, being honored with fame among all men for all time to come; if I transgress it and swear falsely, may the opposite of all this be my lot.*

(Cited in Mappes, & Zembaty, 1993)

Although the oath is to be a set of laws which physicians follow, the Hippocratic Oath has been customized and refitted to meet the values of a constantly changing medical profession. Thus, at times, the Oath is subject to interpretation and re-interpretation. Depending on one's individual ethical perspective, the re-interpretation may occur for the better (as in the dismissal of the clause excluding women from the profession, or the clause prohibiting abortion), or it may occur for the worse (as in dismissal of the clause prohibiting euthanasia or the clause prohibiting abortion). Suffice it to say, varying interpretation of the Hippocratic Oath illustrates the fact that certain things may be ethically acceptable by some people at a certain time while not acceptable at another time.

Subjective interpretation of the laws and obligations of the medical profession has been especially problematic since the institutionalization of medical experimentation during World War II. This paper examines how the changes in ethical beliefs regarding medical research have shaped the history of medicine of the twentieth century. A consideration of ethical abuses in twentieth century research, with specific emphasis on the infamous Tuskegee Syphilis Trials, will be examined from a philosophical, legal, and historical perspective with the goal of incorporating past transgressions into a historical framework that includes current research concerns. The ultimate goal of this paper is to present ethical issues in a way that encourages critical examination of the merits and relevance of the issues presented to the current state of research. This is important since a democratic society requires individuals who are well versed in the discussion of ethics and who are able to think critically regarding

important procedural, institutional and political decisions, the fates of which are often dependant on public opinion.

### **The Legacy of Nazi Research**

At the end of World War II, as the Russian Army began to liberate Nazi concentration camps such as Auschwitz and Buchenwald, the world soon began to realize the horrors that had occurred within their walls. Under the pretense of "euthanasia" the Nazis killed 90 000 people. Nazi leader Adolf Hitler's "Final Solution" program resulted in the killing of 6 000 000 Jews, 600 000 Poles, thousands of Gypsies, homosexuals, and political opponents. The mass killings were orchestrated, in part, by the hands of the so-called "Angel of Death" Dr. Josef Mengele, the Munich educated physician in charge of the extermination and research.

Even a cursory examination of the research carried out by the Nazis under Mengele's direction demonstrates the absolute degeneration of Nazi medicine. In Mengele's 20 months at Auschwitz, the infamous twin experiments were carried out. Mengele selected identical twins from the prisoner population to serve as subjects in his experiments testing whether he could find a way to overcome genetic effects by modifying the environment. His experiments included: the injecting of dye into children's eyes to see if he could make them turn blue (this may have been of personal interest to Mengele as his own eyes were brown); breeding of female twins with male twins to see if the offspring were twins; interchanging of the blood of identical twins and pairs of twins to see the effects; and, the surgical connection of two twins into one "Siamese" twin. In other experiments, he tested the limits of the human endurance to electric shock and radiation. After the war, Mengele escaped to South America where he was said to never have expressed regret for any of his actions. He reasoned that the Jews were to have died at Auschwitz regardless of whether he used them in experiments (Nizkor FTP Directory: [people/m/mengele.josef/](http://people/m/mengele.josef/), 1997).

Mengele was not the only Nazi physician who took part in this type of research. Dr. Sigmund Rascher performed experiments for the Luftwaffe testing the ability of the body to survive extreme changes in altitude (he discovered that blood does not boil at 70 000 feet). In addition, he examined the ability of Jewish women to revive subjects who had been frozen. At the Buchenwald concentration camp, in an experiment carried out by a researcher from the Robert Koch Institute, prisoners were injected with typhus and their blood was transfused into other subjects to determine immune effects. Prisoners were also infected with malaria, staphylococci and tetanus bacilli (Pence, 1990).

### **The Nuremberg Trials and the Nuremberg Code**

Subsequent to capture by the occupying allied forces, many Nazi physicians were tried as criminals of war at the Nuremberg Trials held in Nuremberg in 1946. In keeping in line with the attitude of Mengele, many of the researchers defended themselves by stating that the research was related to solving problems related to war and as such, they were justified. In addition, it was asserted that the research performed in the concentration camps was similar to research going on in the United States of America. While the latter argument may have been true to some extent (as will be discussed), there may be an alternate explanation as to

why otherwise normal human beings could perform such heartless and cruel experiments on their fellow humans. It has been argued that the German physicians began to accept the idea of *lebensunwertes Leben* or "a life not worth living" as the moral and ethical justification underlying the mass genocide. Essentially, the Nazi physicians considered the individuals who were their subjects: Jews, Gypsies, Poles, the mentally ill and the developmentally delayed, to be inferior human beings whose life in these circumstances was not worth living. Thus, upon the Hitler's enactment of a law declaring euthanasia legal, Nazi medicine had embarked upon the journey down the slippery slope of medical ethics (Drobniewski, 1997).

Regardless of the possible merits of the Nazi physicians' defense arguments, many were convicted and sentenced to death as war criminals. However, in passing judgment the Nuremberg judges realized that there was no comprehensive code adequately addressing what was ethically allowable in research involving humans (Vollman, & Winau, 1996). The judges thus produced ten ethical research principles that have become collectively known as "The Nuremberg Code of Ethics in Medical Research". The most important of these principles is the first, which addresses the need for voluntary consent of participants in medical research. Since this principle is especially relevant to the discussion of ethical transgressions found in the Tuskegee Syphilis Trials, the full principle is as follows:

- 1) The voluntary consent of the human subject is absolutely essential. This means that the person involved should have the legal capacity to give consent; should be so situated as to be able to exercise free power of choice, without intervention, any element of force, fraud, deceit, duress, overreaching, or other ulterior form of constraint or coercion; and should have sufficient knowledge and comprehension of the elements of the subject matter involved as to enable him to make an understanding and enlightened decision. This latter element requires that before the acceptance of an affirmative decision by the experimental subject there should be made known to him the nature, duration, and purpose of the experiment; the method and means by which it is to be conducted, all inconveniences and hazards reasonably to be expected; and the effects upon his health or person which may come from his participation in the experiments. The duty and responsibility for ascertaining the quality of consent rests upon each individual who initiates, directs or engages in this experiment. It is a personal duty and responsibility which may not be delegated to another with impunity.

Elements of the other nine ethical principles stated in the Nuremberg Code are also relevant to the discussion of ethical violations. The summary of these principles is as follows.

- 2) The experiment should yield results which are beneficial to society, and are unattainable by other methods.
- 3) The experimental design should be based on a knowledge of the problem under study such that anticipated results justify it.
- 4) The experiment should be conducted in a way that avoids unnecessary physical and mental suffering.

- 5) No experiment should be conducted where there is an *a priori* reason to believe that death or disabling injury will occur.
- 6) The degree of risk should never exceed the importance of the experiment.
- 7) Proper preparations should be made to protect the subject against even the remote possibility of harm.
- 8) Only scientifically qualified persons should conduct the experiment. The highest degree of skill is required through all stages of the experiment.
- 9) The subject should be at liberty to end the experiment at any time.
- 10) The scientist in charge should be prepared to terminate the experiment at any stage if there is cause to believe that continuation would result in the subject's injury, disability or death.

(Cited in Katz, 1997)

One of the central tenets of the Nuremberg Code is the prohibition of exposing the subjects to any harm. In this way, the Nuremberg Code is similar to the Hippocratic Oath's pledge to do no harm, however, it presents a more comprehensive definition of acts which are ethically unacceptable in medical research. Subsequent to the creation of the Nuremberg Code, there have been other ethical codes and guidelines that have expanded upon the principles espoused by it such as the "Declaration of Helsinki" in 1964 (Tranter, 1997). These additional codes contain many of the elements of the ten Nuremberg Code principles and further stress the need for voluntary participation, informed consent, and protection of subjects/patients from any potential harm. As will be discussed, these are the fundamental ethical principles violated during the Tuskegee Syphilis Trials.

## **The Tuskegee Syphilis Trials**

### *History of Venereal Disease*

The plague of venereal disease (VD) was associated with sin for hundreds of years. Moralists from the seventeenth to the twentieth century have proclaimed that anyone engaging in the immoral behaviors of pre-marital and extra-marital sex would receive the diseases as a fitting punishment for their sins. The contagious nature of VD was blind as it affected Princes and paupers without regard to social or economic status. As a result, many historical figures, "sinful" as they were, are thought to have been infected with some form of VD, including Charlemagne, England's Henry VIII, Napoleon Bonaparte, Popes Sixtus IV, Alexander VI and Julius the II, Columbus, Mozart, Schubert, Albrecht Dürer, and Nietzsche.

Moral attitudes strongly influenced the various prophylactic approaches aimed at eliminating VD. The moralist's view was that the best form of prevention would be to abstain from "sinful" pursuits of the flesh, while the practical school of thought considered the use of condoms and penicillin most effective. During the Great World Wars, however, the need for

the protection of soldiers who were overseas outweighed the morality debate and aggressive research into the prevention, clinical course and treatment of VDs was initiated.

### *Syphilis*

In 1906, Schaudin discovered that the cause of syphilis was a spirochete. The symptoms of syphilis include: one or many sores, usually painless, on the genitals, rectum, or mouth; rashes anywhere on the body which can be flat, scaly, bumpy, round, or crater like; spots or scaling on the palms of the hands or soles of the feet are common; large moist patches can occur in the mouth and in the groin areas; headaches; sore throat, swollen glands; and, hair loss. The first symptoms start within three months after sexual contact with someone who has syphilis. Infected individuals are often unaware that they have it. Late stages of syphilis can cause permanent damage to the heart, brain, skin, bone, and other organs. Needless to say, it is a serious and potentially deadly disease. In 1909, Ehrlich and Hata discovered the benefits of treating the symptoms of syphilis with an expensive combination of arsenic known as salvarsan, which attacked the spirochete. Unfortunately, the side effects of this heavy-metal therapy were found to outweigh the benefits and the treatment was, for the most part, discontinued. Clearly, more research was needed.

### **History of the Tuskegee Syphilis Trials**

Up until the time of the Tuskegee Syphilis Trials, the only research examining the clinical course of syphilis in untreated humans had been Boeck's Norwegian studies from 1891 to 1910. The results of his studies demonstrated that a large proportion of long-term syphilis sufferers could be asymptomatic. The Tuskegee Syphilis Trials were aimed at increasing the scientific knowledge regarding the clinical course of the disease with particular focus on the long-term effects. The United States Public Health Service (USPHS) decided in 1932 that the town of Tuskegee, Alabama (chosen due to an infection rate of forty percent) would be the site of clinical trials and research examining the treatment of syphilis patients. The trials consisted of three phases from 1932-1972 and involved hundreds of black males from Tuskegee. The first phase was a one-year observational study begun in 1932. This phase simply involved the observation of the clinical course of latent state syphilis to determine the natural history of the disease. This observational phase was based on a rationale similar to that suggested by the eminent Canadian physician Sir William Osler when he said, "Know syphilis in all its manifestations and relations, and all other things clinical will be added unto you." (Cited in Pence, 1997) The subjects of phase 1 were 400 black adult males with early latent stage syphilis. The rationale for observations can be summed up in the words of one of the observing physicians who said that the study presented, "an unusual opportunity to study the untreated syphilitic from the beginning of the disease to the death of the infected person" (Roy, 1995).

The middle phase of the study lasted from 1936-1943. It was characterized by shoddy experimental methodology and lacked controls, continuity of staff, written protocols, and close supervision. In order to determine the progress of the disease, painful and risky spinal taps were performed on the subjects in order to obtain cerebrospinal fluid samples for analysis. Many of the asymptomatic subjects were unwilling to come into the laboratory to



undergo these painful procedures and the physicians therefore employed coercion and deception in order to convince subjects to come to the clinic. Subjects were told that they had to come in for “treatment” or otherwise suffer the results of the “bad blood” that they had. A letter sent to subjects urged them to come in for their, “...last chance for special free treatment.” In reality, no treatment was ever administered, not even treatment with salvarsan.

The third phase of the trials lasted from 1965 to 1972. Prior to this part of the study, penicillin was discovered in 1943. From this time up until the cessation of the experiment in 1972, no Tuskegee subject ever received treatment with penicillin. Control of the Tuskegee experiment was now in the hands of the new Centers for Disease Control in Atlanta (CDC). The CDC formed a committee to decide whether the study should continue. In spite of the objection of some committee members, it was decided that the trials would continue (Faden, Lederer, & Moreno, 1996). The question of whether the subjects should be treated with penicillin was also addressed. The committee (which by 1969 also consisted of black members) decided that treatment was to be withheld.

In 1972, the Associated Press broke secrecy of the Tuskegee study. Public and political reaction was swift and extremely critical. Subsequent action taken by the CDC and the USPHS was to minimize or deny the ethical and moral corruptness of the experiment. The federal government began movement towards compensation for the subjects who were still alive and a federal committee documented subject’s claims that they had not been told they had syphilis, had not been offered appropriate treatment, and, in some cases, had not been told anything at all. As a result of this, subjects took their case to federal court and eventually settled out-of-court with the government. By the time the settlement had occurred, the public had forgotten about the story.

## **Ethical Issues**

Many ethical issues are worthy of mention considering the history of the Tuskegee Syphilis Trials, especially since the ethical and procedural contraventions continued after the development of the Nuremberg Code of Ethics in Research (Moreno, 1996).

One of the foremost ethical issues meriting discussion is the violation of the principle prohibiting the harm of the patient. As has been discussed, this is one of the most important tenets of both the Hippocratic Oath and the Nuremberg Code. Did the physicians participating in the Tuskegee experiment violate this sacred canon? Did non-treatment of the subjects *cause* undue harm? Does the withholding of penicillin constitute researcher-initiated damage? On the one hand, it can be argued that occurrence of the symptoms of syphilis would have occurred anyway, therefore, examining the course of the disease is non-invasive and does not cause any extra impairment. On the other hand, it could be considered that non-treatment of the infected subjects allowed the subsequent infection of the subject’s wife, their children (congenital heredity occurs in about forty percent of cases), as well as others having sexual relations with the subject. This possibility was not considered as there was no effort made to survey syphilis in wives and children of the subjects and since almost all of the subjects were married, and had an average of 5.2 children, the persistence of the

disease in Tuskegee would have been ensured by non-treatment since the researchers did not know (as is now known) that late-stage syphilis is rarely re-infectious. Additionally, the argument that since the sickness would have progressed without the physician's help anyway it might as well be studied, is frighteningly similar to the defense put forth by the Nazi physicians to rationalize experiments on prisoners. They too said that since the prisoners were to die, an examination of their death was justified.

Another major ethical issue to consider is the use of deception and the lack of informed consent characterizing the experiment. Subjects have been quoted as saying that they did not know that they were taking part in a study and were coerced to participate by offers of free transportation, hot meals and free burials (Dowd, & Wilson, 1995). As well, they were never told that penicillin was a possible means of treatment. It can be argued that since the study began prior to the release of the Nuremberg Code of Ethics, it is unfair to pass judgment based on later standards. Again this illustrates the problem identified by the Nuremberg judges who experienced a measure of difficulty in passing judgment over Nazi physicians considering that no objective rules existed. As such, judgment had to be deferred to past documents stating the rights of individuals such as "The US Bill of Rights" or the French National Assembly's "Rights of Man". With regards to the issue of deception, even if it can be argued that not telling a patient the truth even if potential harm may result, is warranted, there is a great distinction between simply not giving out all the facts and out-right lying to patients as was done by the researchers in Tuskegee. Additionally, considering that the USPHS adopted the principle of informed consent in 1966, why was the experiment allowed to continue until 1972? What factor differentiated the Tuskegee study from other studies run by the USPHS and the CDC, which had to abide by the laws of ethics that were in place.

One possible reason that the Tuskegee Syphilis Trials were allowed to continue as long as they did is similar to the reason that Nazis were able to proceed with their horrific experiments - the research was racist. Just as the Nazis felt that the subjects of their experiments were lesser humans living *lebensunwertes Leben*, American medicine, just like American society was racist. As such, the value of black subject's lives were not seen to have equal value to those whom the research would benefit - white Americans (McCarthy, 1994; Roy, 1995). This racist attitude may have allowed the Tuskegee physicians to become complacent with regards to the possible ethical and moral violations committed. Even the fact that there were black members on the CDC committee which voted to continue with the experiment in 1969 does not invalidate this possibility as there were also Jews in the concentration camps (known as Kapos) who were in charge of controlling and disciplining large numbers of their fellow brethren. Since these Kapos were not in control, what choice did they really have? Similarly, the black physicians sitting on the CDC committee in 1969 had just begun to make inroads into the medical community in a deeply segregated southern US state. How much opportunity did they really have to disagree with the other white committee members? The belief in the racist undercurrents of the Tuskegee Syphilis Trials has left a lasting impression as will be discussed in relation to the current state of medical research.

## **From Tuskegee to the HIV/AIDS era: Similarities**

There are many similarities between syphilis and HIV/AIDS aside from the obvious fact that they are both transmitted via exchange of bodily fluids. Epidemiologically, since a patient can test positive for syphilis and not exhibit any symptoms just as patients can test positive for HIV and show no sign of AIDS, AIDS was in fact thought to be a manifestation of syphilis. Although this hypothesis was nullified with the discovery of HIV as a retrovirus, there are many other historical similarities between the two diseases. Early campaigns against both diseases were distorted by misinformation and fraught with moral judgments. As a result, the US government found itself compensating the victims and relatives of the Tuskegee Trials, and the Canadian government has recently been obliged to compensate individuals who became infected with HIV/AIDS in the infamous Red Cross Tainted Blood scandal. Additionally, in spite of a Senate Committee inquest into the Tuskegee affair, no one has ever been formally charged or held ultimately responsible. This eerily resembles the recent release of the Krever Report on the tainted blood scandal that held no specific individual or group of individuals accountable.

Finally, there is a cynical view, held by some, that the Tuskegee experiment is proof of a racial conspiracy, initiated by the government, whose goal was the elimination of blacks through infection and spread of syphilis. Considering the similarities in ethical violations between the Tuskegee physicians and the Nazi physicians discussed earlier, one might not fail to understand why this belief might be held. Likewise, some cynics hold the opinion that HIV/AIDS may have been manufactured and propagated throughout the homosexual and black communities for the purpose of eliminating both populations (Guinan, 1993). Regardless of the factual content of these theories, their mere existence and persistence are a testament to the public's mistrust in the government, medical institutions and medical research. Is this mistrust warranted considering the medical community's mishandling of syphilis and HIV/AIDS? Whatever the answer to that question, it is the task and responsibility of medical researchers and physicians to earn the trust of the public. The US federal government has taken such steps when in the fall of 1997, American President Bill Clinton issued a formal apology to the victims of the Tuskegee experiment and their families. The Canadian government has also issued a formal apology to the victims of the tainted blood scandal.

As effective as these attempts to placate the public's distemper are, more must be done by those who are charged with the maintenance of public health. There is a need for public as well as professional education regarding the historical and contemporary status of scientific research. This is especially evident considering the results of a recent survey of public health students showing that only 19% demonstrated any knowledge of the ethical significance of the Tuskegee Syphilis Study (Couglin, Etheridge, Matayer, & Martin, 1996). Furthermore, low participation of African Americans in clinical trials is thought to be related to their mistrust of the medical community and lack of information regarding the trials (Harris, Gorelick, Samuels, & Bempong, 1996). These barriers can be overcome with a commitment to proper patient education on the part of the medical community (Reamer, 1993).

Finally, the implementation of Institutional Review Boards (IRB) by research institutions following the Tuskegee Syphilis Trials has done a great deal to ensure that ethical codes of conduct are strictly adhered to.

## Conclusion

Controversy surrounding the ethical issues brought to light upon examination of the history of medical research in the twentieth century continues unabated. Most recently, a very bitter public dispute has been waged between the members of the New England Journal of Medicine's (NEJM) editorial staff regarding an editorial criticizing the ethics of current AIDS research conducted by American researchers in Africa. The dispute stems from the claim that the current practice of withholding treatment in control groups of HIV infected subjects (a practice that is disallowed in North America) is as unethical as the Tuskegee Syphilis Trial's practice of withholding treatment was. The dispute resulted in the resignation of two editorial board members who denounced the editorial with a scathing letter printed in Time magazine. These researchers argued that controls are an absolute necessity and that non-treatment subjects know both the consequences and the scientific rationale of withholding treatment. Needless to say, the ethical debate rages forward.

In conclusion, upon examination of the ethical issues pertaining to the history and future of medical research in the twentieth century, a final comment can be made. With regards to the freedom of subjects from harm and the need for informed voluntary consent, one could deconstruct all of the complex philosophical arguments and considerations down to one simple golden rule - Do unto others as you would have them do unto you.

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# **JEAN MARTIN CHARCOT: ON NEUROLOGY, PSEUDO-ALIENISM, AND THE TEACHING OF FREUD**

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## **ABSTRACT**

Approximately two and a half decades had passed since the fall of Napoleon and the end of the French Revolution, Louis XVIII had passed on and Charlex X had taken over the throne of France leading the country into a time of republicanism, self enrichment and academic prosperity. It was during this time of great intellectual pursuits that Jean Martin Charcot was born, on November 29, 1825. Little did his parents know that their son would become a founding forefather in the field of Clinical Neurology. Equipped with the creativity and skills of an artist plus a flare for differential diagnosis and observation, Jean Martin Charcot would create for himself, a career in medicine rich in research and discovery. Through his love of the obscure and seemingly unexplainable motor behaviors; his love affair with the great hospital, La Salpêtrière; and his perfection of the anatomo-clinical method of studying patients presenting with neurological disturbances, Charcot and his students made numerous monumental discoveries. From the first description and classification of Multiple Sclerosis in 1868 to the formidable discovery of the anatomical lesions responsible for Amyotrophic Lateral Sclerosis, Charcot was truly a master of the neurological domain. In 1870, his neurological pursuits would cross paths with psychiatry as Charcot sought to tackle and define the great neurosis, otherwise known as Hysteria. His use of hypnosis to elicit symptoms of hysteria in a number of his patients and his drive to find an organic base to this psychological state of mind would attract the likes of Sigmund Freud and Pierre Janet to study under him at the great Salpêtrière. A man of his time and perhaps beyond, Charcot's work has become immortalized in the fields of neurology and psychiatry making him a truly admirable figure in the History of Medicine.

Throughout time people have been intrigued by that complex and mysterious organ- the human brain. No other organ in the body is capable of such diversity of function. Presently there is a great body of knowledge surrounding the nature of the brain and how it enables us to interact both effectively and appropriately with the environment that surrounds us. However, scientists are still struggling to uncover the remaining secrets the brain has hidden in its meshwork of neurons. Neuroscience and clinical neurology could not have reached our advanced state of knowledge without the work and determination of several key figures in

history. Perhaps one of the most influential is a gentleman by the name of Jean Martin Charcot, a French neuropathologist born to Simon Pierre, an artisan and carriage maker, and Jeanne-Georgette Saussie, on November 29, 1825.

Charcot was raised in a middle class family, which afforded him the opportunity to pursue a number of lucrative career paths including that of art or medicine. A gifted artist, Charcot struggled with choosing between the two careers. At the time, art and medicine were intimately intertwined with medicine requiring such skills as observation and visual documentation, which would be well served by Charcot's artistic abilities. Artists and physicians of the time were admired for their intelligence and independence and both professions held the potential for future financial freedom. In the end, however, the field of medicine took hold of Charcot's future with a more solidified promise of economic gain. In 1843/44 Charcot set out to pursue his post secondary education at the Faculté de Médecine in Paris at the young age of 18. The sentiment of the time was "Enrich yourself" as the country of France was undergoing a political shift towards republicanism. This shift in thought and practice fostered an environment that supported both hospitals and physicians financially, allowing doctors to pursue career paths less broad in scope and more focused on sub-categories of illness. Charcot, who had a penchant for the bizarre and supernatural, was more than eager to focus his studies on the contorted deformities he had seen in many of the patients he had worked with during his internship at the famous Salpêtrière. Thus, began his career.

Charcot's final thesis, completed in 1853, was heralded as an important glimpse into the young physicians future as it displayed a somewhat unnatural flare of independence and originality (the majority of research at the time were regurgitations of old ideas). Charcot's research demonstrated a unique ability for differential diagnosis and an ability to draw important comparisons between clinical and anatomical findings- two talents that would serve him well in his path towards fame. A decade went by and Charcot had progressed through the hospital system moving from Chef de Clinique to Médecine des Hôpitaux, an administrative/supervisory position that did not provided him with the opportunity to study patients first hand- something Charcot truly enjoyed.

In 1862, Charcot took on a position at his "internship" stomping ground, the Salpêtrière. Originally opened as a hospice for vagabonds and indigents in 1657, the Salpêtrière became increasingly used for the housing of the mentally ill, particularly for female patients with mental disturbance. By 1837, it had become known as the Hospice de la Vieillesse Femmes. Charcot was drawn to the Salpêtrière. For him, it represented a Mecca of clinical observation; a place for him to work his diagnostic magic and to develop his teaching and research skills. Charcot (1870) was quoted with the following description of the institution: "... this vast emporium of human suffering... a seat of theoretical and clinical instruction of uncontested utility". His return to Salpêtrière was an important turning point in his career. For one, Charcot was coming back to the place he loved and secondly, he was choosing to be a "non-rotating" physician, which, at the time, was an uncommon decision as most physicians chose to move their work from one hospital to another for the majority of their career(s). Thus, Charcot, in making this decision brought much needed attention to both his work at the institution and to himself, as a prominent figure in the medical community.

Charcot's time at Salpêtrière was spent collaborating with many individuals, working on a wide range of pathological subjects including diseases of the nervous system and rheumatism. Eighty-one publications later, he found himself in an opportunistic position to apply for a much-desired professorship and, after several attempts, two glowing letters of reference from the Minister of the Interior and the Minister of Finance, and 6 years, Charcot was finally awarded the position of professor.

It was from this point in 1872 that Charcot's rise to fame took an exponential route; before long, Charcot was attracting the likes of Gilles de la Tourette, Alfred Binet, and Sigmund Freud as his dedicated disciples. Charcot's teaching style incorporated the use of meticulously prepared lesson plans along with clinical demonstrations or "les enseignements pratique". His courses consisted of subject material related to his research endeavors undertaken with his students- the pathophysiology of multiple sclerosis, ALS and various arthropathies were popular subjects. Through combining lecture with clinical presentation, Charcot earned himself a rather favorable reputation. As Joffroy (1893) points out, "... his (Charcot) artistic turn of mind, which knew how to display findings, at times even evoke them, and confer a truly extraordinary salience to his scientific demonstrations... which used to strike the eye and the imagination making an unforgettable impression on the memory of his auditors...". By 1880 Salpêtrière had become a Mecca of neurology and "les leçons du Mardi", special, clinical presentation sessions offered by Charcot every Tuesday afternoon, formed the foundation for the neurological services offered at the institution. These lectures were exclusively clinical and involved patients living in the community (outpatients) who had common and sometimes rare diagnoses. Charcot would interview the patient at the front of the lecture hall and would then give his students the opportunity to see, first hand, the difficulties of diagnosis and the practice of medicine. These Tuesday lessons gained significant acclaim and were first translated and published in German by Freud and went on to be published in both Russian and Japanese. As stated by Babinski, "... they (Tuesday lessons) emphasize everyday, general neurology with all of its surprises and complexities...".

In Charcot's presence, the study of medicine remained intimately tied to the world of art. When patients with a particular disease were not available, Charcot, a master of neuropathology resorted to using hand drawn illustrations and even photography, a very novel approach at the time, to demonstrate important symptoms like disordered gait, tremor, or anorexia. His talents as both a teacher and a physician were further enhanced by his use of the anatomo-clinical method study to correlated symptoms seen in patients with specific anatomical lesions in the brain. The application of this method of research stemmed from observations Charcot had made between patients with rheumatologic disease and neurological disease. Charcot noted that patients diagnosed with neurological disease could suffer joint related problems and, conversely, those with rheumatologic disease were susceptible to neurodegenerative symptoms (ie: joint neuropathy). These observations led Charcot to look towards degenerative changes in the spinal cord in order to provide a common link between these two realms of disease and, thus, the anatomo-clinical method was born. "It is a new means to bring together organic illnesses which are similar and to distinguish those which in spite of sharing similar symptoms, are of a nature altogether different and which therefore belong to another order of illnesses" (Charcot, 1867). Through careful recording of case histories and observations made throughout the life of the patient



and through anatomical studies completed via autopsy at the time of the patient's death, Charcot was able to explain and define several important neurological diseases that have persisted through time. Among his discoveries, Multiple Sclerosis and Amyotrophic Lateral Sclerosis hold particular fame.

In 1868, Charcot made the first diagnosis of Multiple sclerosis and assigned to it a definition that still holds today. "... on histology sections, multiple sclerotic lesions contain perivascular, inflammatory, and demyelination plaques [that can] occur anywhere within the white matter of the central nervous system". The disease itself is characterized in the literature by Charcot's Triad, which includes nystagmus, intention tremor, and scanning speech. Just 6 years after this infamous description, the first neurological correlation between a clinical symptom and the 2 distinct lesions that define Amyotrophic Lateral Sclerosis was defined. Charcot went on to further define and subcategorize ALS, providing the field of neurology with descriptions of Charcot-Marie-Tooth Disease and joint neuropathy, a complication of diabetes and syphilis.

In addition to his significant contributions to the field of neurology, Charcot had an important and lasting impact on the field of psychology. In the early 1870's Charcot's interest in the field of neurology took a logical shift towards the emerging phenomenon of hysteria. Physicians and psychologists of the time (then referred to as "alienists") viewed the mental state of hysteria primarily as a nonsensical disorder, affecting women who basically desired attention from those around them. However, Charcot's astute observations led him to believe quite the contrary. This mental phenomenon had many similarities to the neurological signs and symptoms of epilepsy, similarities, which led Charcot to believe that seemingly mentally based problems, could feasibly have an organic basis. Despite the objections of his colleagues in neurology, Charcot chose to collaborate with the alienists and began studying the organic, neurological basis of hysteria. Through his work with various students and astute observations of patients displaying symptoms and signs consistent with a diagnosis of hysteria (anorexia, nausea, paralysis, mutism), Charcot delivered his first lecture on hysteria in June 1870 and continued to deliver 4 more lectures based on several patients in his service who displayed intermittent symptoms of the great neurosis. These patients had obvious, overt clinical symptoms but no physical cause could be scientifically determined. As previously mentioned, hysterical patients were thought to exhibit their symptoms as a direct result of malingering. Although Charcot did not prove otherwise, he did attribute hysterical symptoms to male patients and thus, indirectly destigmatized women, removing the gender specific nature of hysteria. Charcot argued hysteria to be a genuine illness caused by neural degeneration passed down from generation to generation and only those who were susceptible would acquire it. In order to further study the symptoms of hysteria, Charcot used the controversial method of hypnosis (developed by Mesmer) to determine the physiological pathology of hysteria. With this tool in hand and many patients to be observed and studied, Charcot became the first to truly define this elusive illness as consisting of 4 basic symptoms or stages:

- i. Epileptoid (tonic seizures)
- ii. Contortions, acrobatic postures, clownism
- iii. Emotional gestures, verbalizations
- iv. Final delirium

While Charcot maintained his organic beliefs, he was not adverse to the idea that hysteria had some psychogenic component as he often drew correlations between his patient's environmental conditions and the manifestation of hysteria. Essentially Charcot brought psychological and medical symptoms of disease together along a continuum versus maintaining the separation between the two realms of pathology. Charcot's work had considerable impact on the world of psychology and psychiatry despite the fact that his work at Salpêtrière was very removed from that of the alienists in terms of location and theory. If and when he did come into contact with persons with significant mental ailments, Charcot would attribute it as being a direct result of neural pathologic processes. Generally, Charcot would leave the psychological aspects and complications of a neural degenerative diagnosis in the hands of the alienists. In any event, Charcot's ability to marry these two distinct specialties, bringing them together as one, was of great importance in the future directions of the two fields; one may even say Charcot's work helped to legitimize the field of psychology. As he so eloquently stated "...research [on hysteria] which will inevitably and surely shed light someday on a host of questions not only in the realm of pathology but also in physiology or psychology" (Charcot, 1893).

Charcot's research and observations on the nature of hysteria would be further enhanced and exploited by Sigmund Freud, who, in 1885/86, ventured forth to the great Salpêtrière to work under the guidance of Charcot. Equipped with an avid interest in neuropathology, Freud was intrigued by Charcot's incorporation of psychological dimensions into disorders traditionally defined as somatic (specifically epilepsy associated with hysteria or hysterio-epilepsy). The Freud-Charcot relationship would have a significant impact on the future directions of both neurology and psychology, no longer would the two disciplines be viewed as separate and distinct, as both contained commonalities.

After a lengthy battle with angina, Charcot passed away on August 16, 1895 from severe pulmonary edema. Charcot's legacy, however, would live on. In the end, he left us with the creation of neurology as a firm discipline. From his work stemmed many great names in neurology and psychology, as well as timeless methods of both research and medical instruction.

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# THE LITTLE PRINCE: ALIEN OR ASPERGER'S?

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## ABSTRACT

**“If a little man appears who laughs, who has golden hair and who refuses to answer questions, you will know who he is. If this should happen, please comfort me. Send me word that he has come back.”**

It appears to be purely coincidental that the two men whose names are synonymous with autism published their influential works within a year of one another. Leo Kanner, in a 1943 paper entitled ‘Autistic Disturbances of Affective Contact’ recognized a syndrome in children characterised by autistic aloneness, a desire for sameness, and islets of ability. In 1944, Hans Asperger described an “autistic psychopathy in childhood” that was clearly part of the same spectrum as Kanner’s syndrome because it shared a similar developmental history. Though their definitions differed in many ways, both men used the term “autistic” to describe the qualities of aloneness and a lack of social sense. Kanner adopted the term “early infantile autism,” thus linking it, albeit inappropriately, to Bleuler’s concept of schizophrenia. However, in recognizing the unique characteristics of these particular children, Kanner separated them from what was, to that point, an amorphous group of mental subnormalities and childhood psychoses. Asperger’s definition of autism was broader, and his series of case studies included children with a wide range of abilities. While Kanner never mentioned Asperger in his writings, Asperger recognised similarities between the two syndromes, though still maintaining that the two were separate conditions. In 1943, yet another individual published a book, though fictional, that presents what could be interpreted as a striking case study of a child with Asperger’s syndrome. The author was Antoine de Saint Exupery, a French pilot and adventurer. The book’s title character exhibits abnormalities of speech, non-verbal communication, motor coordination and social interaction, in addition to a circumscribed set of interests and skills which bear eerie similarities to the group of subjects described by Asperger as “strange children who gazed about them as if they had just fallen to earth. Furthermore, the behaviours of the little prince, and his tragic demise are consistent in many respects with the modern-day definition of Asperger’s syndrome that appears in the DSM-IV.

Until the late 1970’s, it was Leo Kanner’s name alone that was synonymous with autism. Published in the United States, Kanner’s landmark paper provided a classic description of children who from birth or very early in life were socially aloof and indifferent, mute or had

echolalia and idiosyncratic speech, were intensely resistant to change in their own repetitive routines, and who had isolated skills in visuo-spatial or rote memory tasks against a background of general delay in learning (Frith). Kanner borrowed the term “autism” from Bleuler’s work on schizophrenia, published in 1911. Bleuler singled out autism as one of the fundamental features of schizophrenia, and regarded it as an active withdrawal from reality in order to live in an inner world of fantasy. Kanner suggested that infantile autism was the earliest form of schizophrenia, and that autistic children were of potentially normal intelligence (Freeman). Originally, Kanner hypothesized that the syndrome was genetic in origin, but, influenced by the prevailing attitudes in the USA of the time, he wrote in 1949 that the cause of autism was emotional, not physical. He went on to say that the disorder was due to abnormal child rearing by cold, over-intellectual parents who were of high social class. This idea was readily adopted, since psychoanalytic furor was at its peak (Frith).

In 1944, Hans Asperger, a Viennese paediatrician, published the first in what was to become a series of papers on older children and adolescents who were naive, inappropriate, and egocentric in social interaction, had good grammar and vocabulary but repetitive speech with poor intonation and poor body language, were absorbed in circumscribed interests, and usually had poor motor coordination. The children whom he described as suffering from “autistic psychopathology” were of borderline, normal, or superior intelligence, but often had specific learning difficulties (Frith). Asperger always maintained that the syndrome he described was due to an abnormality in certain aspects of brain development that were likely genetic in origin. Unlike Kanner, he did not believe that autism was a type of schizophrenia or any other form of psychosis. Asperger’s definition of autism was wider than Kanner’s, and included cases that showed severe organic damage and those that shaded into normality. Today, the label of Asperger’s syndrome tends to be reserved for the rare intelligent and highly verbal, near-normal autistic child (Wing).

Though Asperger’s work was widely recognized in mainland Europe immediately after its publication, it was virtually unknown, or perhaps ignored, in English-language literature. Asperger’s view was that autism was an inherited personality variant. He wrote about seeing similar, but milder features in the parents, most often the father (Frith). This view was seen as politically incorrect in its time, since psychoanalytic theories were popular and the idea of blaming mothers for childhood psychiatric disorders was prevalent. However, in the early 1980s, several publications discussing Asperger’s ideas were published in the United Kingdom. Lorna Wing and Judith Gould put forth the idea of the autistic spectrum, a range of disorders characterized by triad of impairments in social interaction, communication, and imagination, of which Kanner’s and Asperger’s syndromes are only part. In 1994, Asperger’s Syndrome appeared for the first time in the Diagnostic and Statistical Manual (Frith).

Written in 1943 by Antoine de Saint Exupery, a French pilot, inventor and author, *The Little Prince* is one of the best-known and most beloved books for young people ever published. The plot is very simple: a pilot stranded in the desert encounters an odd child who claims to originate from a tiny asteroid. This little prince shares his planet with three volcanoes and a haughty rose, whose demands confound him. As the pilot struggles to repair his shattered plane, the little prince recounts the tale of how he came to Earth. Seeking a better

understanding of friendship, the little prince had embarked upon an interplanetary journey, where he met and was baffled by various adults, including a king, a conceited man, a tippler, a businessman, a street lamp lighter, and a geographer. Each, like the little prince, lived on a small, lonely planet. Finally, the little prince arrives on Earth and is disappointed to find it seemingly uninhabited, as he lands in the midst of the desert. Through his interactions with a patient fox and with a poisonous snake, the little prince learns valuable lessons about the nature of friendship. Though the little prince also finds a kindred spirit in the pilot, his desire to return to the demanding rose and his familiar home leads him to make a deadly pact with the snake.

Aside from the appeal of the simple, fable-like structure of the narrative and its accompanying illustrations, it is the little prince himself that makes this book most intriguing. The character of the little prince has been interpreted in many ways, and it has been suggested by various authors that he represents one's "inner child." It has also been suggested that the character was based upon Leon Werth, a childhood friend of Saint Exupery, to whom the book is dedicated. However, if the book is interpreted more literally, the bizarre behaviour of the little prince may be viewed in another manner. His fantastical tale of interplanetary travel may be his interpretation of his trials in attempting to integrate himself into various social situations, while his homesickness for his minuscule planet of origin may be indicative of the obsessive attachment that autistic individuals have to their homes and especially their favourite possessions. Asperger's insightful 1944 paper provides not only his first general description of what he at that time called "autistic psychopathy," but also four intriguing case studies of school-aged boys who epitomised this form of autism. "In what follows, I will describe a particularly interesting and highly recognisable type of child. The children I will present all have in common a fundamental disturbance which manifests itself in their physical appearance, expressive functions, and indeed, their whole behaviour." Although Saint Exupery's little prince is a fictional character, his appearance, verbal and non-verbal communication, and social interactions bear striking similarities to Asperger's description. Even when the more recent revisions to the diagnostic criteria for Asperger's syndrome are applied, the little prince may still be considered to possess the characteristics of an individual with the syndrome.

"Once one has properly recognised an autistic individual one can spot such children instantly. They are recognisable from small details, for instance, the way they enter the consulting room at their first visit, their behaviour in the first few moments, and the first words they utter (Asperger)." In his original paper, Asperger emphasised that the appearance of the autistic individuals that he had studied was distinctive. He describes autistic children as having "highly differentiated, finely boned features" and as having an "almost aristocratic appearance." While this generalisation is now controversial, it may be applied anecdotally to include Exupery's title character. It is interesting to note that the little prince's lineage is not mentioned at any point in the text, nor is he ever illustrated as wearing a crown or other royal accouterments. Thus, the narrator's conclusion that the boy is a prince must be arrived at solely through the child's physical features and mannerisms, which he describes as "charming." The narrator goes on to describe the little prince as a "fragile treasure," and speaks tenderly of "his pale forehead, his closed eyes, his locks of hair that trembled in the wind." Asperger also mentions several times that autistic children often have poor gross

motor coordination. More recent research has demonstrated that most people with this syndrome are poor at games involving motor skills. In addition, the executive problems inherent to the disorder have been shown in some cases to affect the ability to write or to draw (Wing). It is an interesting hypothesis, then, that the little prince is so anxious for the narrator to draw him a picture of a sheep upon their initial meeting because he suffers from what would now be referred to as a non-verbal learning disorder, which prevents him from drawing or writing by himself.

Unlike individuals with more severe forms of autism, those with Asperger's syndrome are generally highly verbal. Most begin to speak at the age expected in normal children, while others may begin to speak at an extremely early age (Frith). However, it is the content of speech that is abnormal, tending to be pedantic and often consisting of lengthy disquisition on favourite subjects (Wing). A full command of grammar is sooner or later acquired, but there may be difficulty in using pronouns correctly, with the substitution of the second or third for the first person forms (Wing). Sometimes a word or phrase may be repeated over and over again in a stereotyped fashion. The little prince appears to do this often, stating "the grownups are very odd" each and every time he encounters one of the adult residents of the various planets that he visits. A child or adult with Asperger's may create neologisms, or use words in a manner that is unusual. Utterances are always logical, even if they are unrelated to the question or originated from an unusual point of view (Wing). The little prince's odd form of logic is illustrated in an angry diatribe against "adults" who are too caught up in "matters of consequence" to listen to his tales: "There is a certain red-faced gentleman...he has never done anything in his life but add up figures...and that makes him swell up with pride. But he is not a man--he is a mushroom!" It can be assumed that the little prince means to say that the man, swollen with pride, is like a mushroom, but the manner in which he expresses this is rather unusual. The patterns of speech used by those with Asperger's syndrome may be slow, and there may be irrelevant or tangential replies to questions (Wing). Consistent with this, the narrator notes that "information would come very slowly [from the child], as it might chance to fall from his thoughts," and that "the little prince, who asked me so many questions, never seemed to hear the ones I asked him. It was from the words dropped by chance that, little by little, everything was revealed to me."

Many deficiencies of non-verbal communication are seen in individuals with Asperger's syndrome. Often, there may be little facial expression except with strong emotions such as anger or misery. Gestures are commonly limited, or else large and clumsy and inappropriate for the accompanying speech (Frith). Conversely, comprehension of other people's expressions and gestures is poor and they may misinterpret or ignore these and other non-verbal cues (Wing). The oddity of the little prince's non-verbal communication is noted by the narrator upon his first encounter with the boy: "I saw a most extraordinary small person, who stood there examining me with great seriousness." Asperger wrote that "autistic children have a paucity of facial and gestural expression...while talking...their face is mostly slack and empty, in line with the lost, faraway glance." The narrator describes the boy in a very similar manner, describing him as looking "very serious, like some one lost far away." The little prince is also described as having "an odd little voice," a characteristic that Asperger had also noted in many of the autistic children he had studied, describing their speech as "unnatural, often like a caricature, which provokes ridicule in the naive listener."

In addition, if the illustrations of the little prince are examined carefully, a lack of physical expression is apparent. His eyes are blank and empty, and his posture stiff and awkward. While the illustrations are cartoon-like, the peculiarities of the character's gestures are very noticeable, particularly when compared to the expressive and deeply etched faces of the "adults" depicted in the book.

Repetitive activities and a stubborn resistance to alterations of deep-seated routines are other key behaviours seen in those with Asperger's syndrome. Children with the disorder enjoy spinning objects and watching them until the movement ceases, to a far greater extent than normal. The narrator eventually comes "to understand the secrets of [the little prince's] sad little life...for a long time [he] had found [his] only entertainment in the quiet pleasure of looking at the sunset." The little prince's true obsession with sunsets becomes apparent later in the book: "if he had been a master of...complete authority, he would have been able to watch the sunset, not forty-four times in one day, but seventy-two, or even...two hundred...without ever having to move his chair." Asperger also noted that "autistic children suffer from homesickness much more severely...It is possible that an exceptional degree of bonding to the objects and habits of the home, bordering on the obsessional, causes these children to suffer so much at separation." Indeed, the little prince does suffer from terrible homesickness, to which he eventually succumbs with tragic consequences. Another of Asperger's observations was that "in everything these children follow their own impulses and interests regardless of the outside world." In the case of the little prince, this assertion is supported by the narrator's description of the child's behaviour upon their first encounter: "[he] seemed neither to be straying uncertainly among the sands, nor to be fainting from fatigue or hunger or thirst or fear. Nothing about him gave any suggestion of a child lost in the middle of the desert, a thousand miles from any human habitation." Finally, it may be suggested that the "tiny planet no larger than himself" from which the boy originates is merely a metaphorical representation of the tightly circumscribed, isolated world of a child with Asperger's syndrome.

People with Asperger's syndrome, in its most classical form, may display amazing skills in addition to, or perhaps in spite of, other impairments. It is not uncommon for them to possess excellent rote memories and become intensely interested in one or two subjects, such as astronomy, geology, history, the genealogy of royalty, bus time-tables, prehistoric monsters, or the characters in a television serial, to the exclusion of all else. The little prince is fascinated by sunsets, cleans and tends to his planet compulsively, and speaks at length about his rose, with whom he appears to be virtually obsessed. Typically, individuals with Asperger's syndrome absorb every available fact concerning their chosen field and talk about it at length, whether or not the listener is interested (Wing). One such lengthy disquisition by the little prince, directed at the narrator, illustrates this habit well: "When you've finished your own toilet in the morning, then it is time to attend to the toilet of your planet, just so, with the greatest care. You must see to it that you pull up regularly all the baobabs, at the very first moment when they can be distinguished from the rose-bushes which they resemble so closely in their earliest youth." He becomes "white with rage" when interrupted by the pilot, who is distracted from attempting to repair his plane by the child's incessant talking. Furthermore, the little prince is skilled in gardening to such an extent that he can actually communicate with his prized rose. He is also somehow able to understand and communicate

with animals, and seems to be able to empathise with them more readily than with other human beings. This is an ability that he appears to have in common with Temple Grandin, an American woman with autism who has devoted her life to designing more humane livestock-handling devices by putting herself in the place of the animals that will eventually use the equipment (Frith).

While Wing writes that people with Asperger's syndrome have little grasp of the meaning of the facts they learn, Asperger always maintained that the children he studied possessed excellent abilities of logical abstract thinking. Consistent with Asperger's view, the little prince makes many insightful comments within the narrative that appear to be beyond what would be expected for his age. Some of the little prince's comments such as "what makes the desert beautiful...is that somewhere it hides a well," are not only surprisingly mature, but also poetic. At times, his abstractions appear to be beyond the narrator's grasp, something that is illustrated in the pilot's statement that "my friend never explained anything to me. He thought, perhaps, that I was like himself. But I, alas, do not know how to see sheep through the walls of boxes," and also in the passage "He answered me at once, 'Oh, come, come!' as if he were speaking of something that was self-evident. And I was obliged to make a great mental effort to solve this problem, without any assistance."

"[The] disturbance [of autism] results in severe and characteristic difficulties of social integration (Asperger)." It is this impairment in two-way social interaction that is the most blatant and debilitating characteristic of individuals with Asperger's syndrome. However, it appears that this impairment in social interaction is not due primarily to a desire to withdraw from social contact. Rather, the problem arises from a lack of ability to understand and use the unwritten, unstated, constantly changing rules governing social behaviour (Wing). "[One patient] did not know the meaning of respect and was utterly indifferent to the authority of adults. He lacked distance and talked without shyness even to strangers (Asperger)." The little prince also possesses this characteristic, which is apparent in several interactions with the adults he meets on his journey. He rarely says hello nor good-bye to any of the adults he encounters, and is described on several occasions as "[going] away puzzled," more or less in mid-conversation, often talking to himself. "[Autistic children] may demand a service or simply start a conversation on a theme of their own choosing. All this goes...without any regard for differences in age, social rank or common courtesies (Asperger)." This disregard for social niceties is also displayed on several occasions throughout Saint Exupery's novella. For example, the little prince is confounded by the fact that the king that he meets refers to him as "a subject", wondering aloud, "how could he recognize me when he had never seen me before?" He did not know how the world is simplified for kings. To them, all men are subjects." During his encounter with the 'conceited man', the little prince demonstrates that he cannot grasp either the concept of saluting one's elders, or of applauding someone who has performed well, viewing both as a game "more entertaining than the visit to the king." Interestingly, the little prince seems to most easily befriend the characters in the novella that are the most eccentric. For example, he says of a lamplighter, who spends each moment of his day repeatedly lighting, then extinguishing a street lamp, "this man is the only one of them all whom I could have made my friend," adding that he was "sorry most of all to leave [the lamp lighter's] planet because it was blest every day with 1440 sunsets." Upon meeting a geographer, who explains that he



is “‘a scholar who knows the location of all the seas, rivers, towns, mountains, and deserts,’” the little prince says, “‘here at last is a man who has a real profession!’”

Asperger stated that normal children acquire social skills without conscious awareness because they learn such skills instinctively. In contrast, people with Asperger syndrome have to learn social skills via intellect, and may require constant reminders of how to behave in particular situations. It is theorized that they lack the intuitive knowledge of how to adapt their approaches and responses to fit in with the needs and personalities of others, a deficit that is termed “mind blindness.” Unlike typical children, who are able to learn social skills through the unconscious observation of others, autistic children have to learn such skills systematically, just as they would learn their school lessons. This sort of “teaching” is illustrated in the little prince’s interaction with a desert fox, who wishes to be tamed by the child: “‘What must I do, to tame you?’ The little prince asks, ‘First you must sit down...in the grass...you will sit a little closer everyday...[and] observe the proper rites...’” the fox explains. However, the little prince is still baffled by this friendship ritual, and becomes hung up on the semantics of the lesson, asking, “‘What is a rite?’” As is characteristic of most individuals with Asperger’s syndrome, the little prince does not seem to completely understand the concept of friendship in the same manner as a typical person. After taming the fox, the little prince admonishes the fox for crying at his departure, saying “‘it is your own fault...I never wished you any sort of harm...you wanted me to tame you...but now you are going to cry...[so] it has done you no good at all!’” Some individuals with Asperger’s syndrome may be aware of their difficulties and even strive to overcome them, but in inappropriate ways and with little success. Like the little prince, they may flit from person to person, never making any firm emotional connections, and treating other humans as study subjects rather than as companions.

Though Asperger concluded his groundbreaking paper with a rather optimistic view for the futures of children with his syndrome, writing: “despite abnormality [they] can fulfill their social role within the community, especially if they find understanding, love, and guidance.” However, more recent studies have demonstrated a less rosy view. Clinically diagnosable anxiety and varying degrees of depression are found commonly in individuals with Asperger’s syndrome, especially as they approach adolescence (Wing). Many eventually become aware that they are different from their peers, and may become overly sensitive to criticism and extremely socially isolated. In a follow-up study of twenty-two people with Asperger syndrome, five had attempted suicide by the time of early adult life (Wing). In addition, individuals with Asperger’s syndrome are easy targets for ridicule and bullying, perhaps because “they give the impression of fragile vulnerability and a pathetic childishness, which some find infinitely touching and others merely exasperating.” (Wing) It may be hypothesised then, that the prince makes his suicide pact with the snake not simply because he believes that he will be able to return to his own planet, but rather because he feels intensely alienated from and overwhelmed by our Earth.

Why is it of any consequence that the little prince appears to have suffered from Asperger’s syndrome? Indeed, he is simply a fictional character, invented by a man who is long-deceased. However, the exploration of the nature of Asperger’s syndrome using a well-known, simply written book may prove to be a valuable teaching tool, particularly for young

people. Furthermore, from the eerie similarities between Saint Exupery's description of the alien child and of Asperger's initial case studies, two major questions arise. First, if the character of the little prince was based on a living individual, did this person have Asperger's syndrome or another form of autism? Second, if the book was autobiographical, did Saint Exupery himself suffer from Asperger's syndrome? Though he disappeared mysteriously following a plane crash not long after the publication of *The Little Prince*, it is known that Saint Exupery had an almost unnatural obsession with aircraft, and was described posthumously as "a strange human being, exceptional and wonderful, a prince, a generous prince, aloof, lost among us (Eyheramonno)." Regardless of whether a *real* little prince ever existed, a reexamination of the novella based on Asperger's writings and on the more contemporary views of his syndrome may prove to be invaluable in understanding the fascinating, complex, and wondrous individuals with this form of autism.

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# **MEDICAL VICTIMOLOGY: A HISTORY OF A YOUNG MEDICAL FIELD IN LIGHT OF NEW REALITIES OF THE 21<sup>ST</sup> CENTURY**

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## **ABSTRACT**

**Medical victimology is an important branch of a complex field of general victimology, which is one of the youngest and most complex disciplines comprising many scientific and practical fields. Victimology was born after the Second World War, in 1948. Von Hentig, Mendelsohn, and Fattah have made significant contributions in the first stages of the development of victimology. Mendelsohn (1956) defined “General Victimology,” which unlike criminal victimology, mainly deals with minimizing human suffering. Although victimology initially focused on criminological and legal problems, it soon became apparent that there was an important medical component which needed to be considered from the victimological point of view. The subject of medical victimology, according to Separovic (1983), is twofold. First, it includes medical conditions in victims (individuals or groups of people), which are caused by crime or accidents, natural disasters, or war. Posttraumatic stress disorder is an example of a psychiatric condition developed as a result of psychogenic traumatization in victims. In addition, medical victimology comprises situations where different medical conditions have been developed as a result of medical manipulations of treatments (however, the notions of iatrogenesis and victimization are not identical). The new realities of the 21<sup>ST</sup> century stressed the importance of both aspects of medical victimology. The events of September 11, 2001 caused significant traumatic experiences and reported depressive and anxious reactions in a large number of people who required medical assistance. At the same time, the possibility of human cloning which is becoming a reality, is now being considered not only as a promising source for effective treatments, but also as a possible threat to humanity. One can predict the growing acceptance of medical victimology and the increased passage of its development in the 21<sup>ST</sup> century.**

The events of September 11, 2001 have drawn attention to a field of medicine, which could deal with consequences of the massive psychological damage experienced by the Western Civilization. Information about the significant increase of consumption of anxiolitics and antidepressants, as well as the exacerbation of some somatic conditions (such as heart attacks) showed that many people had been victimized (in a medical sense) by the terrorist attacks on September 11, 2002. Medical Victimology is a field which specifically deals with such events. However, this field of medicine is relatively young and as a result, is not well

established. It is not included in the list of widely recognized medical specialties and is mostly being developed by researchers representing different scientific fields.

Victimology, or a science about victims, is one of the youngest and complex disciplines comprising many fields, one of which is medicine. Victimology, as a recognized scientific field, was born after the Second World War, in 1948 when Von Hentig published his book The Criminal and his Victim. However, it should be noted that some of the main ideas of victimology have deep roots in the history of civilization. Since the age of ancient cultures, one can find the existence of the concept of victims. For example, during the Babylonian Empire, the Hammurabi's legislation recognized the concept of victims' rights in criminal proceedings. They also acknowledged and implemented the idea that restitution is superseded by repression and that the victim plays an important role in the determination of restitution (Kirchoff 1994).

According to Kirchoff (1994), the concept of victim and the victim's role in the determination of restitution was present in the ancient penal law of the Hebrew judges. It is interesting to note that in the Hebrew Law, "the victim himself determines the kind of restitution" (Kirchoff 1994). There are many other historic examples where the concept of victim played an important role. It is fair to state that over the centuries the word victim came to have additional meanings, but until the end of World War II it did not refer to a scientific field. The historical moment of the birth of victimology as a scientific discipline was quite symbolic. It was the time of widespread comprehension of the terrible psychological (and somatic) consequences of World War II for many prisoners of Hitler's camps who returned home. There is no doubt that victimization of millions of people during World War II brought increased attention to human suffering and stimulated the development of victimology as its own field of science.

In 1947 B. Mendelsohn introduced victimology as a "science of the victim." In his lecture to the Romanian Psychiatric Society in Bucharest, he "coined the term victimology" (Hoffman 1992). It is important to note that Mendelsohn presented his concept to the physicians and pointed out the importance of dealing with the personality of the victim. However, a widespread recognition of the concept of victimology was triggered by Von Hentig's book The Criminal and his Victim (1948). As a criminologist, Von Hentig suggested that the behavior of the victims of criminal offence plays an important role in the interaction between the criminal and the victim.

It is worth noting that in 1949, an American psychiatrist by the name of F. Wertham indicated the importance of the new field of science, which he also called victimology (Wertham 1949). Thus, Mendelsohn, who initially named this new scientific field, and Wertham, who represented the medical community, enhanced medical and specifically, psychiatric applications of victimology. Besides Von Hentig, Mendelsohn, and Wertham, a Canadian criminologist, E. Fattah, has also made significant contributions in the development of victimology, but he was mostly focused on the criminological aspects of this field (Fattah 1971, 2000).

The ideas of victimology, proposed by the founders of this scientific branch, have been widely accepted by the international scientific community. The World Society of Victimology was officially established in 1979. Since that time, many countries developed their own national victimological organizations. Up to the present time, there have been ten World Symposiums of Victimology, the last one being held in Montreal in 2000 under the title, “Research and Action for the Third Millenium.”

As typical for any new and evolving field of science, the scope of victimology, as well as the main definitions of its subject, have been matters of discussion. With this respect, O’Connell describes a variety of opinions, such as, “Elias (1986), for example, argues for global victimology, whereas Fattah (1991) narrows the scope of victimology to criminal victimization” (O’Connell 1999). He further states that Knudten (1992) proposed much broader subjects of victimology which encompass criminal/penal victimology, political victimology, economic victimology, familial victimology, and medical victimology.

Knudten’s broad division, which includes medical victimology and presents specific interests to physicians, has its own historical roots in the development of victimology. It was B. Mendelsohn who in 1956 gave an extended definition of “victimity” and victims. Mendelsohn defined “General Victimology,” which unlike criminal victimology, mainly deals with minimizing human suffering. He believed that victimology should deal not only with victims of crime, but also with victims of accidents and natural disasters. In 1969, Mendelsohn presented further developments of his concept of General or “Extended Victimology,” and in 1975, he again talked about General Victimology, which is broader than Penal Victimology and includes the study of all kinds of victims (victims of war, accidents, natural disasters).

As pointed out by Van Dijk (1999), Mendelsohn “advocated the development of general victimology as a discipline in its own right, independent of criminology or criminal law, which would assist governments in minimizing human suffering.” Mendelsohn’s position shifted the attention of researchers to how victims can be assisted in dealing with alleviations of adverse consequences of traumatic events that caused their victimization. It is evident that this position has attracted mental health workers, such as psychiatrists and clinical psychologists.

The applicability of Mendelsohn’s definition of victimology can also be seen through the widespread development of clinical victimology and victim assistance organizations. Kirchoff (1994) mentions that multiple countries have established victim assistance groups. USA, Canada, Belgium, England, Israel, Germany, Netherlands, France, and Spain are all members of this movement.

It should also be noted that during the past several years, South Africa became one of the important centers of victimology. In addition, a number of countries in Asia, including Japan, China, Hong Kong, Thailand, Philippines, and Nepal have all initiated the implementation of victimological concepts.

The Mendelsohnian-like broad definition of victimology has been accepted by the United Nations in its Declaration on the Basic Principles of Justice for Victims of Crime and Abuse of Power (1985). According to this declaration, victims are:

*“persons who, individually or collectively, have suffered harm, including physical or mental injury, emotional suffering, economic loss or substantial impairment of their fundamental rights, through acts or omissions that are in violation of criminal laws, including those proscribing criminal abuse of power. A person may be considered a victim, under this Declaration, regardless of whether the perpetrator is identified, apprehended, prosecuted or convicted and regardless of the familial relationship between the perpetrator and the victim. The term “victim” also includes, where appropriate, the immediate family or dependents of the direct victim and persons who have suffered harm in intervening to assist victims in distress or to prevent victimization.”* (Power 1985)

This definition of victims and victimology can be a focal point for formulating the subject of medical victimology. As defined by Separović, “victimology, in its broadest sense, is the entire body of knowledge regarding victims, victimization, and efforts of society to prevent victimization and preserve the rights of the victim” (Separović 1974).

Even though victimology initially mostly focused on criminological and legal problems, it soon became apparent that there was an important medical component which needed to be considered from the victimological point of view. The subject of medical victimology, according to Z. Separović (1983), is twofold. On one hand, medical victimology comprises situations in which different medical conditions (in individuals or groups of people) have been developed as a result of medical manipulation of treatments (however, the notions of iatrogenesis and victimization are not identical). On the other hand, it describes medical conditions in victims (individuals or groups of people) which are caused by crime or accidents, natural disasters, or war.

From the standpoint of modern developments in medicine, it is surprising to note the accuracy of Separović’s description of the first component of medical victimology. In 1983, he states that “by the technical advancements of medicine, the legal, social and moral responsibility of the physician is dramatized especially in connection with therapeutic risk, human experimentation, artificial prolongation of life (“plug-out problem”), transplantation of organs and other parts of the human body, and genetic engineering.” He further indicates that all types of “human manipulations” for medical reasons should be judged from “the standpoint of respect for human rights and human dignity so as to exclude the possibility of manipulation and victimization of people ” (Separović 1983). The new realities of the 21<sup>st</sup> century have made both aspects of medical victimology of utmost importance.

At the present time, when human cloning is becoming a reality, with all of its ethical implications, the applicability of the described branch of medical victimology appears to be especially relevant. Despite multiple advantages in the treatment of many presently untreatable diseases, several Western countries, including Canada, came to a conclusion

about strict guidelines for human stem-cell research. A recent announcement regarding the planned creation of a National Stem Cell Oversight Committee (Baylis 2002) is symbolic from the victimological point of view, since it signifies the importance of multiple complications, including victimization as a result of new genetic technologies.

Another example of possible negative consequences of the technology development for individuals and humankind can be found in expected advancements of computerized technologies. One of the examples can be drawn from R. Kurzweil, a famous inventor of the most innovative and compelling technology of our era and one, who has already made a number of predictions that pertain to technology. Kurzweil argues that by the year 2019, one should expect that as a result of tremendous computer progress, “high resolution, three dimensional visual and auditory virtual reality and realistic all-encompassing tactile environments [will] enable people to do virtually anything with anybody, regardless of physical proximity” (Kurzweil 2000). This development will signify that “computerized human beings” will spend most of their time in the world of virtual reality and will potentially be victimized as individuals and as members of society by a lack of human-human interactions.

As mentioned above, according to Separović (1983), the second branch of medical victimology describes medical conditions in victims which are caused by crimes or accidents, natural disasters, or war. Van Dijk (1999) indicates that “much research has been done on the problems of survivors of the holocaust and other acts of war and the best methods to assist them in their coping behavior.” The best example of mental disorders caused by victimization is Posttraumatic Stress Disorder, which is a psychogenic condition that develops as a result of “an emotional stress that was of a magnitude that would be traumatic for almost everyone” (Kaplan and Sadock 1994).

The definition of Posttraumatic Stress Disorders (PTSDs) became apparent in the 1980s. However, it has been well known for a long time that “pathologic stress response syndromes can result from exposures to war, sexual assault, or other types of trauma” (Kessler 2000). Kessler further indicates that PTSD is a commonly occurring and long-lasting disorder that is seen in victims of multiple traumas. It is important to note that this disorder is an impairing medical condition that can be seen in individual victims or groups of victimized people.

The events of September 11, 2001 caused significant traumatic experiences that lead to depressive and anxious reactions in large numbers of people who required medical assistance. According to E. Goode (2001), who describes the situation in the US after September 11th, “Americans are moving through anxious days and fitful nights [and] they are filling prescriptions for tranquilizers and sleeping pills at unusually high rates.” J. Dussich, who has experience in dealing with victims of the Kobe earthquake, Sarajevo, and Tuzla, describes his findings among citizens of New York who have been victimized by the tragedy of September 11th. He comes to the conclusion that he “could work there for a year and still have work for years to come” (Dussich 2001).

It is important to note that the American Psychiatric Association (APA) recognized the possibility of significant psychological consequences to the nation and the necessity of

mobilizing the medical community for dealing with such threats. On September 20th, 2001 the APA issued a statement entitled, "Coping with a National Tragedy." This statement is an important acknowledgement of the victimization of people and their "vulnerability to the stress and disequilibrium that disaster evokes" (American Psychiatric Association 2001). It is also notable that the College of Family Physicians of Canada declared its commitment to providing all the required assistance to victims of terrorist attacks (Gutkin 2002).

The consequences of September 11th showed the importance of comprehensive victim assistance programs in dealing with the aftermath of mass victimization. It became more apparent that Mendelsohn's description of general victimology, with its obvious medical applications and ideas about clinical work for victims, could be a basis for theoretical and practical framework for the institutions designated to provide assistance (including medical services) to the victimized population.

There are no doubts that the dramatic events of the beginning of the 21<sup>st</sup> century will create a context for better recognition of the importance and applicability of medical victimology. One can also predict the increased passage of development of medical victimology of the 21<sup>st</sup> century. Therefore, it seems important to recognize the roots and the history of this new discipline, which may have a potential to be eventually recognized by the growing number of physicians.

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# **THE GOOD, THE BAD, AND THE UGLY: THE CONCEPT OF SICKNESS AS PUNISHMENT**

By

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## **ABSTRACT**

**The idea of sickness as a punishment has been powerful in Western society, influencing approaches toward the ill in areas such as public health policy and patient treatment. Within this paradigm, illness is viewed as punishment for individual or collective sins. These transgressions can be either moral or lifestyle choices. This attitude can lead to the stigmatization of the ill and the targeting of certain groups, or has been used to justify existing biases within society. The practice of healing has always been closely tied to religion and moral obligations, and subsequently the battle to reduce the stigma of sickness has been difficult, within the general population and within medicine itself. Even today, modern society is still shaped by this attitude, which is especially apparent with regards to such illnesses as AIDS. This paper will discuss the concept of sickness as punishment throughout the history of medicine.**

## **Introduction**

When faced with severe illness, people often reflect on why they have become ill; “Why me?” or “What have I done to deserve this?” One could propose that these questions are due to an underlying notion that one becomes sick because one has earned it as a punishment for some sort of transgression. Now these sins could be on a personal or a collective level; and they could be either moral or lifestyle choices. This attitude can lead to the stigmatization of the ill and the targeting of certain groups, or has been used to justify existing biases within society. Medicine and healing have always been closely tied to religion and moral obligation, and therefore the battle to reduce the stigma of sickness has been difficult, within the general population and within medicine itself. I will be discussing the concept of sickness as punishment throughout the history of Western medicine, concentrating on specific diseases such as the plague, syphilis and cholera, and how this concept of sickness as punishment is relevant in medicine today.

Early on there was an establishment of the theme of retribution in sickness. In traditional concepts, sickness is generally viewed as a deliberate, non-random affliction, targeted against a specific person or group of people. If only the sick person hadn’t angered their gods or ancestors, then they wouldn’t be sick. You can see this in the Bible, where divine wrath is shown by epidemics such as the plagues of Egypt. Epidemics of any sort have been typically interpreted as acts of God, an attitude that can still be found today. The plague is a good

example of the idea of sickness as punishment. At that time, there was no idea of how the disease was transmitted (although there was lots of speculation), no effective treatment, and masses of people were dying. Because of this idea of divine wrath, there were various attempts to atone for personal or collective sins. This would include going to church, and the popularization of flagellation movements in the fourteenth century. There was also the targeting of those thought to blame for the epidemic, including foreigners, witches, and Jews. A few centuries later, in the 19<sup>th</sup> century during the cholera epidemics, foreigners were also blamed. Foreigners were not the only group targeted for blame for cholera. In the 1830s, physicians blamed the outbreaks throughout Europe and the Americas on the low morals and drunkenness of the poor. Famine, crowding, and lack of health services accompany poverty, creating a cycle where poverty is the cause of disease and disease is the cause of poverty. If you're sick, you can't work, partly because no one will hire you. Sloth is one of the 7 deadly sins in the Christian religion; thus those who are sick are doubly sinners: once for becoming sick and again for being lazy. Some people even consider poverty itself as a sin. It could be argued that impoverished people have been the most victimized by the attitude that sickness is a punishment, and its corollary idea, that health is a virtue. This attitude against the poor has been seen since the time of the plague, where the poor were institutionalized, the middle-class were shut up in their homes and the wealthy escaped out of town. It was the poor who became the nurses and guards of the houses of the sick and thus had more exposure to the sickness. This continued in the industrial revolution, where sickness from slum conditions and occupational illnesses such as lung disease in coal and cotton textile workers affected only the poor. The prevalence of disease in the lower class was used to reinforce existing negative stereotypes. There was even the idea that the poor were deliberately spreading what was considered 'their' infection. Syphilis is a disease that falls under the sin of lust. Sex in general is considered a sin in some cultures and syphilis has been portrayed as a deserving consequence. Syphilis led to the targeting of prostitutes and women in general, because they were considered 'responsible' for the disease, due to the idea at the time that due to their nature, men would inherently seek sex outside of marriage. In fact, even once syphilis was discovered to be a sexually transmitted disease, actually it was thought that a man who had not had the disease at least once was no gentleman. Syphilis was treated with mercury, which was a nasty punitive treatment that brought together therapeutic ideas with moral norms. It is interesting to note that once the true method of infection was known, both women and men affected with syphilis often tried to unload it on young girls and adolescent boys, believing that the purity of young children would accept and destroy the disease. The nature of syphilis is also a good illustration of the grouping of the ill into 'deserving' and 'undeserving' categories, a more recent addition to the concept of sickness as punishment. Generally speaking, the division is based upon factors such as method of infection, as well as social standing and occupation. This idea of deserving and undeserving victims of syphilis is well-illustrated in the French play, *Les Avaries*, in which a man contracts syphilis from a prostitute (the source) and subsequently infects his wife and child (innocent victims). One would think this would increase public understanding of the disease, but the notion of innocent infections actually had the effect of dividing victims, some deserved attention, sympathy, and medical support, while others were responsible for the epidemic. It is interesting to note that *Les Avaries* was later translated and used in a VD education campaign in Canada under the film title *Damaged Lives*. There are many parallels between syphilis and the today's equivalent, AIDS. Methods of infection separate victims into the "innocent,"

namely children and hemophiliacs, and the “guilty” who are considered to be the source of the disease, such as prostitutes, drug users and gay men. There is still the idea that sex with a virgin will cure the disease. By examining public health policy and patient treatment throughout history, it is apparent the degree to which an illness is viewed as a punishment is dependent on several factors: its fatality and treatability, its method of infection, and the visibility of the disease. Cancer, which has great sympathy among the public, was once so stigmatized that few would admit to having it; the first cancer hospital set up in the mid-1700s was forced to close because the public thought that cancer might be contagious. The method of infection is an important factor in the severity of the stigma of illness, especially if it is unknown or is known to be of ‘dirty’ or immoral origin, like sex. Often if the method of infection for a disease is unknown, immoral causes are invented, such as the once popular notion that leprosy was the product of contact with adulterous females during their menstrual period. Finally, the visibility of a disease is integral to the stigma one faces as a sufferer of the disease. Diseases that had tremendous stigma such as syphilis, plague, and leprosy, all have distinct visible physical manifestations, and “visible abnormalities are held to bespeak moral defects.” The medical community must deal with all aspects of disease, ranging from epidemiological control to the results of the stigmatization of illness, such as depression. The development of the germ theory of disease by the likes of Pasteur, Koch and Ehrlich, helped dispel this notion; however the belief that sickness results from sin is still present and relevant today. Some patients still believe that God strikes bad people with cancer. Other people refuse analgesic care for their relative because they believe the patient must suffer in order to get into heaven. In the age of medicare and health insurance, where there is collective payment for individual health care, physicians may be expected to sort the ill into deserving and undeserving groups. The idea of sickness as punishment is also relevant to research into genetic causes of disease, as certain groups are genetically susceptible to certain diseases and the possible construction of a genetic underclass. Investigation into historical and contemporary illnesses illustrates that ignorance compounded by morality and secrecy can obscure the realities of disease, inhibiting efforts to control them, and can propagate intolerance and scapegoating.

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# **“WHAT SEEMS TO BE THE MATTER?” VS. “WHERE DOES IT HURT?” - PAIN MANAGEMENT IN 1800 AND 2002**

By

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## **ABSTRACT**

**Many physicians are wary of treating pain; particularly in its chronic presentation. A physician at a pain clinic in Boston notes that "most doctors' reaction to a patient with chronic pain is to try to pass them off to someone who's sympathetic ... There's one in a lot of communities, but then they get all the pain patients sent to them and eventually they burn out and quit." (New York Times Magazine, Dec. 16, 2001). Noting some of my classmates' distraction during a lecture on fibromyalgia, a disease process presenting as unverifiable and non-localized pain, I have become interested in our collective discomfort. What in the history of ideas undergirding 19th and 20th century western medicine has made us uncomfortable with chronic pain?**

As a first-year medical student, I have begun to experience the discomfort attending the pain that presents to the clinician without an observable lesion. Early in our curriculum, a Calgary rheumatologist chose to describe fibromyalgia, a chronic pain syndrome, in terms of what it is *not*: namely a muscle disease, a form of arthritis, nor an immune system abnormality. Fibromyalgia does not arise from an infection nor does it appear to be correlated with depression, anxiety or stress levels (Martin 2001). Did the subsequent seat-shifting in the lecture hall arise from collective anxiety about what exam questions could possibly be drawn from such an ambiguous picture? It appears that practicing physicians are often thrown by chronic pain as well: Martin went on to say that the large group of fibromyalgia patients referred to rheumatologists “probably includes all the referrals that other doctors haven’t known what to do with” (*ibid*). But the lesion that is so notably absent in fibromyalgia – in fact, the very concept of a lesion as we know it – has only a two-hundred year history. This paper will address the conceptualization and management of pain between 1780 and 1800; a time when physicians were not thinking about the lesion as the seat of disease. From their strategies, we may draw clues for our own approach to chronic pain, which currently exists at the limits of our clinical practice.

In the contemporary medical setting, pain often serves as a diagnostic tool which points up a pathological process in the body. The difference between a pleuritic vs. a retrosternal crushing pain, for example, guides us toward one set of diagnoses over another. We are looking for a problem that we can understand and mend: if we succeed in those projects, then the pain will be alleviated in the process. Our search for a ‘handle’ on (via a pathological correlate for) pain is reflected in the priorities of clinical practice. Whereas patients make

their own decisions about whether or not they are ill, “judgments about the presence or absence of lesion, and hence disease, are entirely the preserve of doctors” (Hodgkiss 2001, 1) Hodgkiss points out that if a patient presents to a physician with a headache, it would be a less grievous error to miss anxiety as the source of that headache than it would be to miss evidence of a brain tumour. Epidemiologically speaking, more damage is done by the inappropriate, long-term prescription of analgesics than by the delayed diagnoses of brain tumours. But in the absence of a lesion that we can correlate by other means, we are left with uncomfortably ambiguous material, namely the ways in which the pain manifests in the remainder of our patients’ life. Although most physicians would agree that this is an important business, it doesn’t seem to be quite ‘ours’ – we have no expertise in this area.

For the physician in 1800, pain also served as an indicator of a larger phenomenon, but that phenomenon tended not to be an underlying pathological process. What was ‘hidden’ was uncertain, and therefore less valuable than that which could be observed. Instead, pain was one element of a constellation of symptoms and signs, and a disease could be named according to which constellation was present. Clusters of symptoms were often classified according to taxonomies based on botanical work (Bynum 1994, 15). Rosenberg points out that the American physician around 1800 had no diagnostic tools beyond their senses, and so it is not surprising that they would need a framework of explanation which emphasized the importance of what they could see (Bynum, 7). If a patient presented in pain, then the physician needed to be able to appreciate the value of that pain in relation to other signs which he was in the habit of monitoring: pulse, urine, respiration, etc.

Reports of pain necessarily involved the spoken word and the patient’s explanation. Physicians in 1800 wondered about what value to place on a patient’s complaints, but such speculation did not necessarily result in an underestimation of the intensity of the pain described by the patient:

*It seems, at the very outset, that in order to appreciate the strength of the pain one has only the sensation of those concerned, and the descriptions they give of it. But, from experience, one knows how often the complaints of the sick bear little relation to their true pains. After a more meticulous examination, one finds that the physician may also ascertain the pain by the ravages it has inflicted on the constitution; and despite the fact that physical pains like mental pains produce different effects depending on patients’ dispositions, one may, by taking this consideration into account, estimate the intensities of the pains by the intensities of their effects up to a certain point. (Double 1805, 24)*

In the absence of imaging procedures or laboratory evidence, these physicians often turned to other aspects of the patient’s life to corroborate a history: “Pain is a very frequent phenomenon in illnesses: in order to deduce signs from it, one must take into account the age, the temperament, the degree of irritability and sensibility ... the type and the duration of the disease” (Landre-Beauvais in Rey 1995, 101). In order to understand how pain was seen in relation to these variables, we must turn to a brief discussion of broader concepts of disease and health in the time.

Many historians of medicine have said that contemporary medicine became recognizable in the 19th century, and certainly, medicine in 1800 was still infused with a Hippocratic spirit. Health and disease were generally perceived as states of the total organism, and health was constituted by a proper equilibrium, rather by than the absence of a particular disease. Rosenberg notes that “the body could be seen – as in some ways it had been since classical antiquity – as a kind of stewpot, or chemico-vital reaction, proceeding calmly only if all its elements remained appropriately balanced” (Rosenberg 1979, 6). The exigencies of everyday life could shift the equilibrium necessary for health, as could seasonal changes or developmental ‘crises’ such as teething, puberty or menopause.

States of health and disease resulted, then, from cumulative interaction between constitutional endowment and environmental circumstance. Perhaps the most crucial part of one’s ‘constitution’ in the instance of pain was the patient’s degree of sensibility. In modern parlance, sensibility is defined as a “capacity to feel,” an “exceptional openness to emotional impressions; delicacy of feeling” or a “tendency to feel offended” (O.E.D., 7<sup>th</sup> ed.). But many historians of medicine have shown that sensibility was a physiological concept before it was an aesthetic one. It was defined as the power to react to or receive an impression, and first described in 1755 as follows:

*The fibre I call sensitive in man is that which, on being touched, transmits to the soul the impression of his contact ... what I call insensitive is that which on being burnt, cut, stung, or contused ... gives no sign of pain, nor convulsion, nor any change at all in the situation of the body* (Haller 1755, 5)

Physicians disagreed as to the site of sensibility in the human body. But all agreed that some of their patients had more of it than others: a number of specific biological, social, and moral distinctions had significance as predictors of human sensitivity to pain. Intellect, youth, social refinement, being a woman, and having white skin all endowed one with a higher degree of sensibility, at once a blessing and a curse.

Then as now, physicians gathered history and symptoms together as an initial approach to their patient. However in 1800, they tended to relate them ‘horizontally’ to each other, rather than ‘vertically’ with an underlying causal explanation. Symptoms and histories were then interpreted within the context of the patient’s life; a context which was sometimes filtered through the lens of social prejudice. The decisions which came next, namely how and when to treat pain, illuminate both the doctor’s and the patient’s perception of the professional role in pain management.

In dealing with the problem of pain, the physician of 1800 had two major therapeutic options: ‘counter-irritation’ and opium. In order to make sense of the former, it is important to note that pain had some value to the clinician; not only as an alarm signal, but as a vigilant internal sense, which could sometimes indicate to the physician how to proceed:

*This bitter fruit of nature hides the seed of a great blessing; it is a beneficial effort, a cry of sensitivity through which our intelligence is warned of the danger menacing us ... A sincere friend, [pain] wounds us in order to serve us*



*... associated to the spasm, it diminishes the plethora, dissolves the swellings, chases away the heterogeneous humours; found on the head, it produces haemorrhage or beneficial vomiting ... When, under the name of gout, it comes to plague old age, it protects against all other infirmity and promises a long life. (Petit in Rey, 90).*

*With the usefulness of pain as a thematic backdrop, it is a little easier to understand the therapeutics of the day when they sought to imitate nature. The concept of counter-irritation, for example, involved inflicting pain in order to cure it. The intention was to transform a pain or a chronic illness into an acute pain in such way as to bring about a 'crisis' that freed the patient definitively of it (Rey, 129).*

It occurs to one to wonder why patients put up with such treatment. It does not appear that physicians were seen as holding particularly esoteric knowledge, or that patients were frightened of them. In contrast, physicians and laypeople seemed to have a more shared understanding of sickness and health than the present day. Rosenberg says that "the effectiveness of the system hinged to a significant extent on the fact that all the weapons in the physician's normal armamentarium worked: 'worked', that is, by providing visible and predictable physiological effects" (Rosenberg, 8). Home remedies were also concerned with eliciting predictable physiological responses, and they mirrored the heroic therapeutics practiced by regular physicians. Perhaps the very severity of therapeutic action seemed to assure the patient and his family that something was indeed being done.

Physicians of 1800 made a distinction between those cases where pain accompanied a crisis from those where it existed without any positive significance for the patient (Rey, 93). In these latter cases, one might use opium. The indications for its use were very broad:

*The pains that opium is calculated to remove are all these that depend on general asthenic affection, as those of the gout, of chronic rheumatism, that of the gangrenous, as well as the putrid sore throat, all spasmodic and convulsive pains, all pains from pure debility as in the legs, ankles and soles, or in any part of the skin, nineteen head-aches out of twenty, which are in that proportion asthenic; the pain of any deep-seated sore or gunshot wound. It is an equal remedy against asthenic inflammation, whether local or general (Johnson 1788, 248).*

It is important to recognize, however, that it would *not* have been acceptable for opium-prescribing to form the majority of a physician's role in 1800. Firstly, patients did not need a prescription for opium; they could obtain it on their own. Moreover, the physician's professional role was to re-establish balance in their patients, even if, from our perspective, the problem seemed quite specific. When mid-eighteenth and early nineteenth-century physicians inoculated against smallpox, for example, they always accompanied the procedure with an elaborate regimen of cathartics, diet and rest. (Rosenberg, 7).

Given the perceived benefits of pain and the overt discomfort of their patients, clinical acumen in 1800 was often defined in terms of the timing of treatment:

*Let us not forget that amongst the motives which must suspend or slow down progress in the art, is that humanity wants a great deal of importance to be attached to pain, which is often inseparable from the destructive action of the 'morbific' principle. Do not let our like perish in order to spare him temporary suffering; but before resolving to make him suffer, let us at least wait to be forced to do so: in that way, he need never reproach us [for having] either a deadly compassion or a barbaric haste (Voulonne 1776, 248).*

Some voices of the time would have pointed to the potential *moral* usefulness of pain, namely as a punishment of misdeeds. These arguments would come into sharp focus fifty years later, during debates about the use of anaesthesia in childbirth. But regardless of the religious convictions of the physician or the patient, "it didn't actually seem to have dictated the behaviour of the physician insofar as his goal was to rationalize his practice" (Rey, 8). Religion did, however, serve as a palliative to the impotence or absence of medical help. It consoled, explained, and gave meaning to suffering for those who endured it.

Suffering could also be found as a predominant theme in the literature of the time. In a well-known letter written in 1819 opposing the traditional view of life as a vale of tears, Keats referred to human existence as "a vale of Soul-making ... Do you not see how necessary a World of Pains and troubles is to school an intelligence and make it a soul?" (Keats 1958, 213). In this romantic view, pain was not an accidental property of human life, but its essential and necessary core.

William James noted in 1901 how the modern interpretation of suffering had changed:

*A strange moral transformation has within the past century swept over our Western world. We no longer think that we are called upon to face physical pain with equanimity ... The ways in which our ancestors looked upon pain as an eternal ingredient of the world's order, and both caused and suffered it as a matter-of-course portion of their day's work, fills us with amazement (James 1901, 32)*

Nearly a century later, Morris puts the same point more dramatically:

*"Americans today probably belong to the first generation on earth that looks at a pain-free life as something like a constitutional right" (Morris 1991, 277)*

Several things have changed about the way we manage pain in the present day. First, we are certainly less likely to attend to an entire individual as the locus of disease. Although a more holistic method has been readopted since the 1960's, it is arguably more difficult to apply in the present day. The patient and physician often have only a glancing acquaintance with each other, and patients may come from cultures different than our own.

Secondly, the pressure to have a physician ‘validate’ one’s pain has increased. This validation must take place in order to secure pharmacological pain relief and, often, to have one’s treatment costs reimbursed. In a society that accords such respect to medicine, it is also surely a source of psychological distress to be told by a physician that ‘nothing is wrong’ when one is experiencing pain. It should be noted that what we actually mean is that we cannot correlate their pain with our own methods.

Thirdly, the meanings of pain outside medicine have changed. Broadly, it can be said that suffering is now accorded less positive value. We often hear that a strong will can influence the body, but an implication of such a position is that infirmity is somehow associated with lack of individual strength. When dealing with pain, our present medical model limits us to a view that takes in less than the whole person. However, because social meanings of pain have shifted as well, patients are forcibly reliant on the medical profession to not only tend to, but validate their suffering. In my view, our discomfort as students during a fibromyalgia lecture has two implications: either physicians must come to acknowledge and value the ways that pain plays out in our patient’s lives, or we must realize that perhaps this is not our area of expertise and ensure that that we are working with professionals who can rise to that challenge.

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# ISLAMIC HOSPITAL

By

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## ABSTRACT

**In time during which the religion of Islam progressed, many things were changed as well as invented by the Muslims and many discoveries and progress were made. Medicine was an area where there was a lot of interest and this was probably because the Prophet Muhammad said that for every illness there was a cure. One of the achievements of the Muslims was progress in the concept of a hospital.**

**Hospitals then were called bimaristans, meaning places for the ill. They had an organization with hierarchy in the management of the hospital. There were also the division within the hospitals, separate sections and departments for the various specialties, separate halls for the women and the men and also separate nurses to care for these patients. The hospitals were free for the people and were financed partly by the government and partly from the donations given by the wealthy lords. The hospitals had many interesting things that were unique for that era. It was interesting that the concept of the Islamic hospital then, between the 700s and 1200s, is similar to the concept of the hospital today. Not much has changed; it may be that the ideas for hospitals today were inspired by old Islamic ideas.**

Arab civilization flourished between the 7<sup>th</sup> and the 13<sup>th</sup> century, which was when the religion of Islam was founded in the Arab states. This was when the Islamic culture was on the rise. It was a fast spreading religion, connected with many achievements. There were many discoveries made in medicine. Other areas too flourished, such as art and architecture, poetry, music, architecture and education.

The question to be asked was why were there such advances in medicine during that time? The main reason for the Muslims' interest in health was the saying of the Prophet Muhammad, that God had given a cure for every disease. This made the Muslim people struggle to look for these cures.

One of the greatest achievements of the Islamic time was the building of hospitals, which were established in large urban structures. A hospital is called a bimaristan, which is a Persian word. The word bimar means ill person and the word stan means place, so bimaristan is a place for the sick. Some accounts credit the Umayyad caliph Al-Waleed for founding the earliest hospital, which was possibly a leprosarium established early in the 8<sup>th</sup> century in Damascus. The earliest documented hospital established by an Islamic ruler was built in the 9th century in Baghdad probably by the vizier to the caliph Harun al-Rashid. By

the 12<sup>th</sup> century, the city of Baghdad was said to have 60 hospitals, whereas London was building its first hospital. There were many reasons why so many hospitals were present at that time. The three main ones were religion, since in Islam it says that people have to care for those less fortunate than themselves; politics, since rulers built the hospitals to show the people that they cared and this benefited the people and lastly for eternity, since rulers in Islam built schools, mosques and hospitals to leave behind something under their name, as the pharaohs in Egypt built pyramids.

With so many hospitals, financing was something that needed to be considered. The hospitals in Islamic lands were financed from the revenues of pious bequests called *waqfs*. Wealthy men, and especially rulers, donated property as endowments whose revenue went towards the building and maintenance of the institution. The property could consist of shops, mills, caravanserais, or even entire villages. The income from an endowment would pay for the maintenance and running costs of the hospital, and sometimes would supply a small stipend to the patient upon dismissal. Part of the state budget also went toward the maintenance of a hospital. Each hospital had a superintendent supervising the institution and all the departments had their specialists helped by nurses and compounders. Not only that, but every hospital had accountants and other executives and importantly a sanitary inspector, whose job was to ensure that principles of public health and hygiene were maintained.

Two types of hospitals existed at that time. One was a mobile dispensary that had medical care, diet, medicines, clothings, doctors and compounders and moved from village to village where no permanent hospitals were present. The other was the regular hospital in a permanent building. There were several departments in a hospital: the department of systemic diseases which was further categorized into a section dealing with fevers and another dealing with digestive problems, the department for ophthalmic cases, the surgical department, the orthopedic department and a department dealing with mental diseases. Every hospital also had a pharmacy, which was a house of decoctions. The Arabs sailed all around the world, from China and the Philippines, to Africa, Europe and Asia, to obtain a variety of drugs. Advances in chemistry also led to a demand and need for a separate specialization in pharmacy.

Within the hospital, separate halls were built for women, and female nurses took care of these while male nurses handled male patients. Patients with contagious diseases were isolated from the rest. Outpatient clinics were frequently present within the hospital. Hospital rooms were neat and tidy, furnished with clean carpets and had a regular supply of fresh water. Cleanliness was a big issue and the water was available not only for washing up but also for praying.

Later on, there were various hospitals, some of them reserved for the army men, and they had their own special doctors. In addition, there were special doctors attending to the caliphs, the military commanders, and the nobles. There were separate hospitals for prisoners. The doctor examined the prisoners every day and provided them with treatment. First-aid centers providing free treatment were set up in busy areas such as mosques. There were also hospitals for women run only by women doctors and midwives.

Many of the hospitals served as training centers for medical students. There were big lecture theaters where the students discussed case studies with the chief medical officer and other medical men, and they all gathered there after attending to the patients. There was also bedside teaching when students were exposed to real patients. Many of the large centers had libraries full of medical texts for the benefit of both medical students and doctors. At the end, students received certificates to prove that they had attended the practical sessions, which was necessary to get a medical degree.

With all this, one can see that the hospital was well conceived administratively, but may wonder how the patients were treated. In fact, there was a systematic approach to the treatment of patients. Once patients came to visit the hospital, they would first be seen in the out door department, where a careful and thorough examination would be carried out. Those in need of casual attention were prescribed medications and sent home. Those requiring more regular attention and supervision were registered as indoor patients.

Once admitted, the patients would then be sent to the bathroom and were provided with clean hospital uniforms while their clothes were kept in the hospital store. They would then be taken to the hospital ward where beds with clean sheets would be ready for use. The course of treatment provided by the doctor would then be started. Hospital records were kept of the patients as well of their medical care for the first documented time in history.

The hospital provided good food that was nourishing and helpful for improvement of the patients' health. The diet consisted of mutton, beef, and poultry. The criterion they had for sound health was that the patients would be able to take the amount of bread normally taken by a healthy person, together with the roasted meat of a whole bird at a time. If the patients were able to digest these easily, they were considered perfectly recovered and healthy. If the patients were cured of the malady, but still weak, they would be transferred to a ward for convalescence until they returned to robust health. Upon discharge, the patients would be given new dress clothes, along with enough monetary aid to support themselves until they could return to work. This was done because the Muslims believed that it was wrong to leave a person out there in the world to survive without any help, especially after just having recovered from an illness, since one principle in the Koran is that the healthy must care for the ill.

Treatment in these hospitals was free because the Muslims believed that it was wrong to leave the sick uncared for. Everyone was treated equally; it did not matter who the person was, whether rich or poor, a local person or a foreigner, a commoner or a distinguished person. Nor did age, gender or color matter when it came to treatment. Drugs were free of charge.

From this brief summary, we can see that hospitals have existed for a long time in the Muslim world with a structure similar to hospitals we have today running on principles similar to those of a modern health care system. They were highly organized and well managed with various departments and specialized doctors seem to have been the first to keep systematic patient records.

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# UTAH'S 19<sup>TH</sup> CENTURY DOCTOR SHORTAGE: A PROGRESSIVE SOLUTION

By

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## ABSTRACT

**In 1847, after a generation of persecution, the Mormons fled the Eastern United States and isolated themselves in the mountains of present-day Utah. They took with them a distrust of outsiders, including medical practitioners of the day. The founder of the Church, Joseph Smith, had lost a brother to a well-meaning physician in 1823, and had carried a personal bias against doctors since that time. After Joseph's murder in June of 1844, the Church was taken over by Brigham Young, who shared Joseph's bias. As Brigham Young aged, and his health deteriorated, he recognized the need for Mormon physicians to treat their own people. In the late 1860's and early 1870's he called for bright young Mormon men and women to go East and study medicine, among whom was Ellis R. Shipp, a twenty-eight year old mother of three. She was involved in a polygamous marriage and left her children in the care of her husband's other wives to attend medical school in Philadelphia in 1872. This paper will discuss Dr. Shipp's career and contribution to early medicine in Utah in the latter half of the 19<sup>th</sup> century.**

*"The time has come for women to come forth as doctors  
in these valleys of the mountains."  
-Brigham Young (1868)*

In the mid nineteenth century, political circumstance and religious conflict led the Mormons to the isolation of the Rocky Mountains in present-day Utah. In 1847 the first Mormon settlers reached the Salt Lake Valley, and in the years that followed several thousands joined them. The communities that were established there proliferated and prospered, developing many of the basic services enjoyed in any other part of the United States at that time. One thing they did not have were medical doctors sufficient for their needs. This was partly due to the isolation they brought on themselves, but also due to a long held bias against doctors by the early Church leaders. By the late 1860's, the Mormon leader, Brigham Young, saw the need to bring many more physicians into Utah, and called for young men and women to go east and attend medical schools. Many responded to this call, including a number of young women, such as Ellis Shipp, who along with other women had a tremendous impact on medicine in the territory of Utah. This was a unique and progressive solution to the problem in a time when women were not readily accepted into medicine.

The distrust of medical doctors stemmed from Joseph Smith's youth. In 1823, when Joseph was seventeen years old, his older brother Alvin was diagnosed with what was thought to be



appendicitis. The attending physician administered a calomel purge (mercurous chloride), which became lodged in Alvin's intestine, eventually causing gangrene and death. This experience and others caused Joseph to lack confidence in the usefulness of doctors. In 1830, at the age of 24 he founded The Church of Jesus Christ of Latter-Day Saints. His counsel to his growing number of followers was to receive blessings from the priesthood leaders of the church to be healed. For those who did not have the faith to be healed, he urged herbs and mild foods, and that they should be treated with tenderness.

When Joseph was murdered in 1844, the leadership of the church fell to Brigham Young. To get away from the increasingly violent persecution in the eastern United States, Brigham Young led the church to the mountains of Utah. Thousands of adherents followed and Salt Lake City sprung up in a relatively short time, as well as hundreds of small towns and farms. One thing that the Mormons took with them to Utah was the well-established distrust of doctors.

As late as 1858 Brigham railed against doctors, declaring, "There is a class of people here who do not believe in sustaining professional doctors. I am one of them..." He went on to say that although there would be some instances where a physician could be useful, as in a surgery, that most often, common sense treatments and blessings of the Lord would keep disease in check. The impact of such a statement would have been tremendous. Brigham was not only the leader of the Mormon Church, revered by virtually everyone in the Utah territory as a prophet, but he was also the political Governor of the territory. His word could quite literally be interpreted as 'the law'.

In Utah in the 1850's and 1860's, academically trained medical doctors were rare. The Mormons had not brought doctors with them when they arrived in Utah in the late 1840's, and had done a good job of keeping them away right through the mid 1860's. Dr. John Park was one physician who tried to maintain a practice in Utah during that time, but eventually left the profession to teach school. In fact, there is no record of any physicians practicing in Utah outside of Salt Lake City until the 1870's.

The Church's position on medical doctors changed toward the end of the 1860's. Brigham had begun to see that medical practices were improving, and he had more interaction with what he saw as conscientious and competent doctors. He was also becoming more concerned about the territory's rising maternal and child death rates. As Brigham aged he also became more dependent on physicians for his own care. When he called for the young and bright to go east to medical schools, there were a number who responded to the call, including his own son, Seymour B. Young who attended the College of Physicians and Surgeons in New York City (present day Columbia University) and graduated with honors in 1874.

A number of young women responded to the call to education, including some who were involved in polygamous marriages. They had the advantage of leaving their children in the care of 'sister-wives' while they went to medical school. Romania Pratt was the first one to go to medical school, enrolling at the Women's Medical College of Pennsylvania in 1874. In 1875, Margaret Curtis traveled to Pennsylvania to attend medical school, but grew weary and

homesick after two months and returned to Utah. One of her sister-wives, Ellis Reynolds Shipp, immediately took her place.

Ellis arrived at the medical school in early November of 1875 and worked hard to catch up on her studies. At this point in her life, the 28 year-old Ellis had borne five children, two of whom had not survived infancy. She left her surviving three children in the care of her sister-wives to attend the Women's Medical College of Pennsylvania. She passed her first year and returned home to Utah for the summer. During the summer she became pregnant, and had her sixth child toward the end of her second year. Ellis decided not to return home to Utah for the summer after her second year, but kept her infant daughter with her in Philadelphia through the summer and for her third year of school.

She was able to overcome the difficulties of having a child with her in Philadelphia while she was attending school, and graduated after her third year with high honors. Having her daughter with her during school did not provide the only problem for Ellis, as she had not been provided any funding to attend university. In addition to being a student and a mother, she was required to take jobs to pay her tuition and room and board. To make money she took sewing jobs when she could, and guarded the hall of cadavers at night.

The time spent away from Utah, obtaining a medical education, did not weaken her commitment to her family or her faith. She recorded some of her thoughts concerning her education and training and the impact they had on her religious beliefs. In February of 1876 she wrote, "I have spent considerable time dissecting. The horrifying dread that so oppressed me in the beginning is wearing off. All disagreeable sensations are lost in wonder and admiration. Most truly, man is the greatest work of God. Every bone, muscle, tendon, vein, artery, fiber, and nerve seems to bear the impress of divine intelligence."

Ellis returned west to practice, where Utah was finally receiving its first generation of trained physicians. She and others enthusiastically took on the frontier with the support of the Church and a new respect from the citizens they served. Ellis specialized in obstetrics and women's medicine, delivering over 5,000 babies in a career that lasted over 50 years.

After graduating in 1878, Ellis was quick to put her training to use. In 1879 she founded the School of Nursing and Obstetrics in Salt Lake City, which would train over 500 women to be licensed midwives. Ellis's contribution to the field of obstetrics and women's health was matched by similar types of contributions from Mormon women trained in other fields. In 1882, the first Mormon affiliated hospital to open in Salt Lake City, Deseret Hospital, was co-founded by a number of women, including Drs. Romania Pratt and Ellen B. Ferguson. Dr. Ferguson was the resident surgeon, while Dr. Pratt specialized in eye and ear surgery. She performed the first cataract operation in Utah.

As the hospital grew, male doctors also began to work at the hospital. This medical facility was not long lasting, however, and closed in 1890 due to a lack of funds. It had been founded with the basic ideals of compassion and charity, and consequently, those patients who could not afford services were not required to pay for them. More and more of the patients at the hospital either would not or could not pay, leading to the institution's financial ruin.

Dr. Ellis Shipp, a very busy obstetrician, had 10 children of her own, six of which survived to adulthood. As well as a full professional and home life, Ellis did not neglect her education, attending the University of Michigan in 1893 to take graduate courses in medicine. She did extensive writing and was widely published on hygiene and public health. She remained active academically, teaching courses in obstetrics into her 80's. She died at the age of 92.

This first generation of female doctors in Utah was brought about by unusual circumstances. They were in a situation of extreme doctor shortage and geographical isolation, far enough away from other major centers that it was not practical for people to commute to doctors in other communities. Health care was becoming an increasing concern, and the solution to the problem included educating these women, something that likely would not have happened if the Mormons had embraced physicians from the outset, and had initially brought some with them to Utah. In this instance, medicine collided with religion and politics to produce a progressive solution.

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# **AN EXAMINATION OF THE EXPERIENCES OF DOCTORS PRACTICING IN ISOLATED ENVIRONMENTS**

By

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## **ABSTRACT**

**From the surgeons on Roman warships who struggled to save the lives of their crewmates to the physicians who will eventually take part in manned, long-duration space missions, doctors who choose to practice in isolated environments face many challenges. Using their journals and memoirs and those of their companions, this paper will examine how three doctors met these challenges.**

**The first, Dr. John Wilson, was a surgeon on a whaling ship in the South Pacific from 1839-1843. The second, Dr. Edward Wilson, participated in two Antarctic expeditions, reaching the South Pole on the second, but perishing with the rest of his expedition members on the return voyage in 1912. The third, Dr. Jerri Nielsen, spent a winter at the Amundsen-Scott South Pole Station in 1999, but had to be evacuated due to the breast cancer that she had to live with while still treating her patients.**

**Although separated by time and technological advances, these doctors had many things in common. They worked without pharmacists, nurses and the equipment and specialists at their home hospitals. On top of all these limitations resulting from being away from home, the environment and situation also wreaked havoc on their normal practices. They had to deal with the psychological problems inherent in spending long periods with the same people in a stressful situation. As well, they had to deal with the specific illnesses caused by living in these environments, such as frostbite at the South Pole, and sunburn in the South Pacific. These and other similarities will be explored to illustrate the doctor's experience of practicing in isolation.**

## **Introduction**

Sometime in the near future, a space ship will leave the Earth's surface carrying a small group of astronauts on a journey to set foot on another planet. This voyage will be at least two years in duration, and this expedition will have to bring with them only what they will need. One of these essentials will almost definitely be a doctor.

What will this doctor do during the trip? Physicists, physiologists and physicians have figured out what kinds of illnesses will be specific to the space environment. Some

psychologists have staked their careers on studying the psychology of isolated environments. However, this question is probably best answered by a historian who can look back on the experiences of other doctors who have practiced for extended time in isolated environments. There are many models from which to choose. For instance, in ancient Rome, warships had surgeons on board. In the Middle Ages, surgeons were brought along on ships carrying dignitaries. More recently, frontier doctors in North America, submarine medical officers and physicians on cruise ships have experienced some degree of isolation.

This paper will examine doctors from three different periods and environments. Using their journals and memoirs, and those of their companions, this paper will examine how these doctors met these challenges.

The first, Dr. John Wilson, was a surgeon on a whaling ship in the South Pacific from 1839-1843. The second, Dr. Edward Wilson, participated in two Antarctic expeditions, reaching the South Pole on the second, but perishing with the rest of his expedition members on the return voyage in 1912. The third, Dr. Jerri Nielsen, spent a winter at the Amundsen-Scott South Pole Station in 1999, but had to be evacuated due to the breast cancer that she had to live with while still treating her patients.

Once these doctors have been introduced through brief biographies, similarities in their experiences will be presented, giving the reader insight into the life of a doctor practicing in isolation.

## **Biographies**

### *Dr. John Wilson*

John Wilson was born in West Yorkshire, England, in 1910. His father owned a small farm and John was the only son of five children in the family. In 1825, John was apprenticed to a surgeon in Leeds for five years. This was an expensive education for his family to support, and he spent the next seven years working off his debt and saving up for the next stage of his education. In 1837, he enrolled as a student at a London Hospital and on October 3<sup>rd</sup>, 1839, he passed the examination to earn his Licence of the Society of Apothecaries. Due to a lack of job opportunities as a surgeon, three weeks later, Dr. Wilson signed up to be the surgeon on the whaleship "Gipsy".

For the next 4 years, Dr. Wilson traveled throughout the South Pacific in the hunt for the sperm whale. Surgeons aboard whaleships were paid, as was the rest of the crew, a share of the amount of money brought in from the sale of the whale oil that was obtained during the voyage. For Wilson, this share was 1/140<sup>th</sup>, only slightly more than the common seaman, who received 1/160<sup>th</sup>. However, there were other rewards to the voyage than monetary ones. Wilson was able to see the South Pacific and the natives of the islands. He was able to go on hunting and exploratory expeditions on some of the islands. Most importantly, he was able to learn a great deal about human nature, and how the crew of his ship behaved after being cooped up together for such a long time.

After his return to England, John Wilson set up practice in London, gaining his MRCS and LRCP before retiring in 1876. John Wilson died in 1879 (Wilson, 1990).

#### *Dr. Edward Wilson*

Edward Wilson was born in 1872 in Cheltenham, England. His father was a consulting physician at the Cheltenham General Hospital. When he was 13, Edward's mother, who had an interest in scientific farming, took over an estate where Edward continued his passion for drawing and collecting. In 1891, Edward entered Cambridge, where his room was filled with osteology specimens and his chalk and pencil drawings. In 1894, he earned his B.A. first-class honours in natural sciences, but failed his higher natural sciences and M.B. exams the next year. He then studied medicine at a London Hospital and simultaneously worked many hours at a mission, where he met his wife. Meanwhile, he continued to draw and worked as a medical artist. In 1898, he was diagnosed with tuberculosis and went to recover in Switzerland. In 1900, he received his M.B., B. Chir and his B.A.

Soon after this, he was informed that there was an opening for the post of junior surgeon and naturalist for the National Antarctic Expedition that would leave in July 1901. His uncle, a general, campaigned for him to receive the position and circulated his nephew's drawings among the Royal Geographical Society, the group in charge of the expedition. After one brief interview with Robert Scott, the leader of the expedition, he was appointed to the position. Despite Wilson being failed by the medical board due to his previous bout of tuberculosis, Scott insisted that he come along. Therefore, from 1901-1904, Dr. Edward Wilson was a part of Scott's "Discovery" expedition, named for the former whaling ship that was used as the headquarters of the Expedition. The journey started out with the "Discovery" travelling on a course similar to that of the "Gipsy" in 1839. In 1902-1903, he, along with Scott and Ernest Shackleton, became the record holders for reaching a latitude of 82 degrees South. At times during the expedition, Wilson had a full sick bay on the ship and some members of the crew died from accident and frostbite. As well, Wilson was busy with, among other things, sketching and collecting specimens of penguins and their eggs.

After his return to England in 1904, Wilson was a member of a commission on grouse disease, a work that would continue until he had reached the shores of the Antarctic a second time. This was to occur in 1910, when Scott informed him that he would be trying to reach the South Pole, and that he wanted Wilson to be the scientific director of the expedition. Wilson agreed, and left on the "Terra Nova" in 1910. There were two main goals of this expedition. These were to gather huge amounts of scientific data, as well as to be the first humans to reach the South Pole. As the scientific director, Wilson was in charge of selecting the team of scientists that were to go on the expedition as well as ensuring that all of the scientific objectives were met. In one of the most daring Antarctic expeditions of all time, Wilson led two others in the middle of the winter, in complete darkness, on a 34 day trek to collect the eggs of the emperor penguin. Three eggs were brought back for further study, but the fact that all three men made it back was the greater achievement.

In November of 1911, Wilson set out to become one of the first people to reach the South Pole. A group of 16 men set out from the main camp at Cape Evans laying depots of food

and fuel along the return journey of the team that would reach the Pole. 148 miles from their destination, the final group consisted of five men, the rest having returned to the camp in order to ensure there were enough supplies for the return journey. On January 17, 1912, Wilson and his companions reached the pole. When they left the camp, they knew that Roald Amundsen of Norway was also attempting to reach the Pole. When they reached the Pole, they found that Amundsen had beaten them.

Already, Scott knew that the return journey would be difficult. The weather was unusually cold for the summer, their supplies were running low and Evans, one of the members of the group, was suffering from severe frostbite on one of his hands. On February 17<sup>th</sup>, Edgar Evans died after numerous falls. On March 16<sup>th</sup>, Titus Oates, another member of the group who was suffering from severe frostbite, walked out of the tent to die. On March 21<sup>st</sup>, the remaining three members of the party made their last camp, all of them dying shortly thereafter (Schullinger, 1985, Swinton, 1977). Although Wilson served as a physician in an isolated environment throughout his time in the Antarctic, this paper will mainly focus on the events taking place on the final journey to the South Pole.

#### *Dr. Jerri Nielsen*

Jerri Nielsen was born in 1952 in Ohio. Her mother, a former nurse, encouraged her in the sciences and medicine. Jerri saved several lives in swimming accidents during her childhood and spent her senior year of high school on an exchange in Sweden. In 1970, she entered pre-medical studies at the Ohio University in Athens. At 23, she entered medical school and married a fellow student. At 29, she had her first of three children. Although she treated numerous patients from abusive relationships, she was not able to recognize the emotional and psychological abuse in her own relationship until well into her marriage. Her divorce from her husband caused a rift between her and her children that has yet to heal. A few years after her divorce, isolated from her children, she saw an ad in a medical journal to work as a physician at the Amundsen-Scott South Pole Research Station for a year. She jumped at the opportunity and was flying to New Zealand a few weeks later.

At the South Pole, in the middle of winter, Dr. Nielsen discovered a lump in her breast. As well as all her other duties, she had to oversee her own diagnosis and treatment and train the people who performed these procedures for her. She was evacuated on October 16, 1999, only a few days before the station would have otherwise been opened. Like Wilson after the "Discovery" expedition, Nielsen has not gone back to practicing after returning to the United States (Nielsen, 2001).

#### **Similarities of the Experiences of Doctors Practicing in Isolated Environments**

These three doctors, although separated by time and situation, had many things in common because of the fact that they were practicing in isolation. These similarities will now be examined with illustrations from their respective experiences.

Most of their time was devoted to activities unrelated to medicine.

Although all three doctors employed as physicians, the majority of their time was not allotted to medical practice. At the end of his four-year voyage, Dr. John Wilson had this to say on the subject:

*No one can conceive the dreary monotony & utter solitude of a South-Seaman's life, & particularly that of y<sup>e</sup>. "Doctor", who has no routine of duty, no fixed or regular employment to divert his mind - unless, indeed, as many do, he takes his spell at the Masthead and pulls an oar... (Wilson, 1991).*

In fact, American whaleships did not even require that a surgeon be on board. The captain, with the help of a medicine chest with surgical instruments, numbered bottles of pharmaceuticals and an instruction book on how to perform operations such as amputations, was expected to treat his crew. During the voyage of the "Gipsy", the main medical activities that Dr. John Wilson noted in his diary were services to Islanders. For instance, he administered smallpox vaccine to children in Hawaii and treated a native who had fallen off a coconut tree and had broken his arm. As well, he also recorded consultations with surgeons from other ships. Scurvy only showed itself amongst the crew once, and John Wilson therefore encouraged the captain to abandon the chase for whales and head to shore. Two seamen also died on the "Gipsy", one from falling headfirst into the hold and the other from a heart attack. They were both dead before Wilson could do anything to save them, and he subsequently read their funeral services. Although Wilson describes many brawls that the crew engaged in after drinking heavily on various islands and that gonorrhea and syphilis was present among some members of the crew, he does not mention anything about treating these illnesses.

On the "Gipsy", Wilson filled his time by writing in his journal, painting and making scrimshaw illustrations (carving a picture into a whalebone) and serving as a liaison between the crew and the natives, as he was the most educated man aboard the ship. As well, he went on numerous hunting and exploratory expeditions on the islands and studied the anatomy of some of the smaller whales that could be hauled up onto the deck. Although he mentions it in the above passage, Wilson himself does not describe any time that he had "taken a spell on the Masthead" or "pulled an oar."

Dr. Edward Wilson was also not overwhelmed with medical matters in his time in the Antarctic. There were usually two surgeons to serve the crew of the "Terra Nova" and "Discovery", although both would often work together on the same operation, and discuss treatment. Wilson produced a very large number of sketches and paintings during the expedition and spent a lot of time writing in his journal and writing letters to his wife and parents. He also helped to produce "The South Polar Times", a newspaper that was published to relieve some of the monotony of the long, dark Antarctic winters. Other duties included taking the same shift at cooking as everyone else and writing up scientific reports. On top of all of this, he had to work with a team of sled dogs and a horse to prepare them for the final polar journey. On his two treks of the "Terra Nova" expedition, Wilson had to collect biological and geological specimens and play an equal role to his compatriots, in addition to his medical duties.



When Jerri Nielsen first arrived at the South Pole in the summer, there was a large number of people there, as many workers were required for the construction of a new research facility. With so much dangerous work going on, in temperatures well below zero, and at a pressure altitude of greater than 11 000 feet, Dr. Nielsen spent most of her time as a physician. However, at the beginning of winter, all of the work crew left for home and the remaining population of the station dropped to forty-one. Despite temperatures that dropped below -100°F and dangerous occupations lending themselves to a few cases of trauma, Dr. Nielsen only saw an average of three patients per day. In addition to her medical duties, she was also responsible for running the station post office and store on Tuesday and Thursday nights, and keeping the books for both. She was also responsible for sharing the duties of preparing meals on the weekends.

### **Treating Themselves and Friends**

Because the isolated groups these physicians worked with were so small, they knew their patients primarily as friends (or enemies), rather than as patients. As well, they had no choice but to treat themselves. These situations are prohibited in practice today, but are unavoidable in isolated environments and the ethical dilemmas arising from these situations faced the doctors daily.

All of the doctors looked at in this paper experienced some form of illness during their time in isolation. Dr. John Wilson experienced an eye inflammation, probably uveitis. Dr. Edward Wilson suffered from frostbite, a bruised shin and, of course, death on his final polar journey. In addition to her breast cancer, Dr. Jerri Nielsen was affected by the same polar illnesses as the rest of the station members. Obviously, dealing with their own illnesses took away from their patient care, and caring for their patients took away from treating their illnesses, but there were no other doctors to relieve them. Edward Wilson put it this way: "This is the most fascinating ideal I have ever imagined, to become entirely careless of your own soul or body in looking after the welfare of others." (Seaver, 1937). In order to treat her breast cancer, Nielsen had to train non-medical professionals to perform biopsies, run IVs, administer drugs and prepare microscope slides. With the internet, she was able to connect with specialist, who guided the group through the treatment. Interestingly, she refused to prescribe herself narcotics on ethical grounds, but this raises the fact that all three physicians would have to self-prescribe medication.

Jerri Nielsen and Edward Wilson both described in detail how close they became to the group of people they were treating. This is a difficult ethical issue, as friendships may cause over- or under-treatment, the relationship may lessen the ability of the patient to divulge confidential or embarrassing information, it may also enhance the ability of the patient to persuade the doctor to do something unethical and feelings of resentment may occur among the small group of people if the medical procedure performed results in poor outcomes. However, in isolated environments, there was no choice but to treat friends as patients.

## **Treating Many Environmentally-related Illnesses**

In these isolated environments, the majority of the illnesses treated were related to the environment. In the Antarctic, these illnesses included: vision loss, a decrease in conceptual thinking, hypoxia, trauma, insomnia (one of Nielsen's patients did not sleep for two months), scurvy (in Edward Wilson's patients, but not Nielsen's) frostbite and depression (probably aggravated by the sunless winters). In the South Pacific, the more common environmentally-related illnesses included trauma, sexually transmitted diseases and scurvy.

## **No Access to Equipment and Personnel of a Hospital**

These groups of people would be away from home, and out of reach of re-supply for such a long period of time that they had to rely on the limited amount of materials that they could bring with them. The number of personnel had to be limited to only those most essential to perform the operation, mainly because of the work involved in supplying each extra person. This therefore meant that these doctors had to practice in a situation very different from a hospital. They did not have nurses, pharmacists or any other members of the health care team to assist them in caring for their patients. In severe cases, they had to rely on the help of the untrained members of their parties. All three doctors at some point did not have adequate means to treat the illnesses of their patients at some point. Dr. John Wilson complained: "How inadequate are my means to combat inflammation in so delicate & important organ of the eye... I have neither leeches nor blistering ointment, nor sacrificator..." (Wilson, 1991). Dr. John Wilson picked up a sterilizing lamp from Roald Amundsen's tent at the pole, as the load of food he had been carrying was lightened and he could now afford the extra weight. Dr. Nielsen "performed a pelvic exam with two kitchen spoons" (Nielsen, 2001) when no speculum was available. She had "no ultrasound, no slit lamp to remove shards of metal from welders' eyes" (Nielsen, 2001). When the station was about to close for outside flights for the winter, Nielsen needed condoms, pathology stains and x-ray films, but the plane carrying these supplies had to turn around due to bad weather, and they had to make do without. The environment also wreaked havoc on the equipment, so much so that when she "discovered that my equipment for treating hypothermia had frozen solid," she "no longer found this ironic" (Nielsen, 2001).

As well, the lack of caring nurses, lab technicians and pharmacists took their toll. Wilson said: "Shipboard is a wretched berth, indeed, for the sick: there be none or hardly none of the whole crew, to ask the poor sufferer, how he does, nor to offer him the least help..." (Wilson, 1991). Nielsen had to combine medicinal and non-medicinal ingredients to make some needed medications, and had to perform all of the laboratory and pathology duties. She described her first solo CBC and complained that it took her two hours.

## **Conflicting Interests - Themselves, Their Missions and Their Patients**

Another interesting aspect of these three doctors' practices was the conflict that sometimes existed between patient care and the overall goals of the mission they were on. Whaling surgeons were rewarded according to the amount of oil they brought home, not necessarily

how healthy their patients were. Therefore, if a patient was sick of an incurable disease, or not getting along with the rest of the crew, it was common to leave them on an island.

*Antonio Jose, Portugese Boatsteerer, had gonorrhea when he first came out from England, & soon after, he was attacked by severe rheumatic pains ... he could not do his duty: he had become emaciated & desponding: at his own request he was put ashore, as remaining in the ship would be injurious to him, in protracting the chance of recovery (Wilson, 1991).*

At Cape Town, South Africa, on the way to the Antarctic, Dr. Edward Wilson also practiced the same medicine by leaving two sick seamen to be treated in hospital, rather than keeping them on the journey. In 1999, when the last few planes were leaving the station before the winter, those station members who felt they could not handle the winter simply took those planes home.

Other aspects of the mission also hampered the doctors' ability to treat their patients. Knowing that they were nearly dead, Scott "practically ordered Wilson to hand over the means of ending our troubles to us, so that any one of us may know how to do so" (Scott, 1923). Edward Wilson therefore gave each of them thirty opioid tablets, enough to kill them. The debate on euthanasia still continues, but Wilson did not have time to debate. Frequently, patients who were not completely well had to be allowed to continue their work. All of the five members of Wilson's polar team suffered from frostbite at some point, as rest was not an option on their journey. When a mechanic was suffering from complications due to a concussion, Nielsen had to let him get back to work before he was medically fit to do so. She "would have kept him longer, but the most incredible thing happened. When Big John got hurt, all the machines stopped running and nobody could fix them" (Nielsen, 2001).

### **Treating Psychological Factors Stemming from the Isolation**

Being cooped up in a small space with the same people day in and day out is obviously a psychologically trying situation. The doctors were all partially responsible for the psychological well-being of the crew. Dr. John Wilson described some of the trying aspects of having a crew cramped together for so long:

*The length of the voyage, the heat of the climate, the salt provisions and indifferent bread, the being cooped up together for so long a time without new objects or fresh topics of conversation, the jealousy, the envy, the hatred & the malice that attends those who excel their fellows - are so many causes that contribute to a state of things oftentimes ending in the most disastrous of consequences (Wilson, 1991).*

As the practice of medicine has become more and more patient-centered, with greater emphasis on the emotional well-being of the patient, Dr. Jerri Nielsen best describes a physician's role in dealing with these problems:

*As the doctor, I was in the thick of it. People brought me their problems as a matter of course, and I was often cast in the role of the mediator...Some people were getting cranky and petty, focusing on imagined slights and the minor social gaffes of others. For many, every insignificant detail assumed great meaning and things that shouldn't matter turned explosive (Nielsen, 2001).*

Another interesting psychological factor of being in these isolated environments was how the attitude towards death had changed from that normally held by the physicians and crew outside of the isolated environment. In Dr. Edward Wilson's case, this simply boiled down to the fact that although there was some form of grief present, if the party had stayed too long to grieve, they would have died themselves. Dr. John Wilson was able to observe the naval tradition surrounding death:

*Death in any shape makes but a transient impression on a sailor: no sooner is the corpse overboard, than, they dismiss all memory or mention of the deceased; his name is never spoken & they pursue their avocations as though nothing had occurred (Wilson, 1991).*

## **Other Similarities**

Although this will probably not be the case for physicians desiring to travel on a long-duration space mission, for the three physicians this essay has examined, getting the job was fairly easy. All Dr. John Wilson had to do was show up at the dock with his medical licence. Dr. Edward Wilson was pretty much given the job because of his artwork and the urgings of his influential uncle. Dr. Jerri Nielsen simply had to respond to a classified ad and was on a plane for New Zealand a few weeks later. Dr. Edward Wilson and Dr. Jerri Nielsen both had to submit to a medical examination, and Nielsen had to undergo psychological evaluation. However, even Dr. Edward Wilson's failed medical examination did not prevent him from going to the Antarctic.

Another common theme, although not really relating to medical practice, was that nicknames were given to many of the people thrust together in isolation. Dr. Jerri Nielsen and Dr. Edward Wilson both give a legend of nicknames and real names for their readers, and usually refer to their comrades by their nicknames. In order to ease some of the monotony of isolated living, numerous celebrations and initiations were undertaken. For Dr. Edward Wilson, this included the naval tradition of, once the equator was crossed, shaving and beating up any members of the crew who had not crossed the equator before. Dr. John Wilson complained bitterly that his captain did not allow this to take place. At the South Pole, when the temperature dropped below 100°F, the station members would sit in a sauna at 200°F and then run naked for 300 yards in the snow around the ceremonial South Pole. Those who made it through this ordeal were known as members of the "300 club". As well, games, such as chess, were played by members of all 3 crews, and every holiday, including ones not normally celebrated at home such as midwinter's day or cinco de mayo, was celebrated with gusto (except in the case of Dr. John Wilson, who complained every Christmas that the Captain wouldn't let the crew have any fun).

Another peculiar practice that did affect the medical activities of the doctors was the tendency of the crews to hoard drinks. The crew on both John and Edward Wilson's ships would save up their alcohol rations so they could drink them all on one night and get drunk. When the South Pole station closed for the winter, the station members purchased huge amounts of beer in that first day. This led to many alcohol-related illnesses, such as falls, alcoholism and brawls, that the doctors had to treat.

## Conclusion

The day to day life of a physician working in an isolated environment is very different from that of a physician in a hospital setting. Throughout the hundred and fifty years which span the careers of the three doctors featured in this essay, some aspects of their lives held constant. Most of their time was devoted to activities unrelated to medicine. They had to treat themselves and their friends. They treated many environmentally-related illnesses. They did not have access to the equipment and personnel of a hospital. They had conflicting interests - themselves, their missions and their patients. Finally, they had to treat psychological factors stemming from the isolation. Most of these constants will probably hold for the lucky (or unlucky) doctors who get to travel on long-duration space missions.

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# **HEALTH-CARE IN WORLD WAR II JAPANESE-CANADIAN INTERMENT CAMPS**

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## **ABSTRACT**

**The objective of this research was to examine the health care of Japanese-Canadians interned in the Interior Housing Centres in British Columbia from 1942-1944. Methods used include administrative reports, a Royal Commission report and secondary sources. It was found that of the 21,000 individuals of Japanese descent in Canada in 1941, 75% were Canadian citizens and 44% were under 19 years of age. Almost 95% of them lived in British Columbia. Fifty-five percent or 11,500 Japanese Canadians were interned to one of the six Interior Housing Centres.**

**In the Centres, many Japanese-Canadians had greater access to health care because it was provided at no cost to them. Additionally, the number of beds per thousand of the population ranged from 18-20/1000 at the various Centres. This greatly exceeds the 6.8 public hospital beds/1000 in British Columbia at that time. However, many of the health issues they faced were a result of the internment. Health problems endemic to the Centres include inadequate resources for adequate nutrition, exposure to extreme temperatures, and inadequate housing and supplies.**

**Further work must be done to come to a satisfactory conclusion about the health-care of Japanese Canadians interned during World War II. This includes interviewing Japanese-Canadians who were interned in the Centres and those who were not. Additionally, actual administrative records about the Centres in the National Archives of Canada should be examined. Reports produced by the Red Cross and the Spanish envoy, whose country was the protecting power for the Japanese-Canadians, could be examined.**

## **Introduction**

In the months following the declaration of war on Japan on December 1941, the Canadian Government began taking actions to remove Japanese-Canadians from the coastal areas of Canada to Interior Camps without due process of any kind. During and after the internment, Reports and Royal Commissions were ordered to evaluate the management of the evacuation and internment. A Royal Commission enquiring into the provisions made for the welfare and maintenance of interned Japanese-Canadians found that "the provisions made by the

Government of Canada through the Department of Labour ...are, as a war-time measure, reasonably fair and adequate". This report is flawed in that while many Japanese-Canadians experienced greater access to health care in the Interior Housing Centres many of the health problems they developed were related to the conditions of internment. This includes the maintenance, housing, health care and food they received while being held by the Government.

## **Background**

In 1941, there were 23, 224 people of Japanese descent in Canada. Of these individuals, 61.8% were Canadian born and 13.6% were naturalised Canadians. Only 25.5% were Japanese nationals.<sup>1</sup> Forty-four percent of Japanese Canadians were under 19 years of age. Almost 95% of them lived in British Columbia, concentrated along the coast and up the Fraser River Valley. They were employed mainly in agriculture (18.8%), fishing (16.3%), manufacturing (13.4%), service (12.9%), and lumbering (8.3%).<sup>2</sup> The eight percent of Japanese Canadians who were in professional or white-collar employment were mostly employed within the Japanese community. The Japanese were greatly discriminated in British Columbia. They had little political power as they were barred from voting, running for office, serving on juries or being employed by any public works contractors or buyers of "crown" timber. By-laws adopted by professions such as Law and Pharmacy prevented Japanese Canadians from entering these fields. Japanese Canadians were not allowed to sit in certain sections of movie theatres, they were often barred from public tennis courts and swimming pools.<sup>3</sup> Although the population of individuals of Japanese descent never exceeded one tenth of one percent, racist attitudes against Japanese Canadians and the concentration of Japanese Canadians along the strategically important coast and in the fishing industry (15% of the industry) lead to their internment.<sup>4</sup>

## **Internment**

The British Columbia Security Commission and the RCMP evacuated approximately 21,000 from the protected areas between March 1942 and March 1943. Those remaining behind were Eurasians, Japanese married to persons of other races, and Japanese in hospitals, prisons and asylums. The evacuees' properties were vested in the Custodian of Alien Property. The Canadian Government's internment policy initially sent male evacuees to road camps in the BC interior, sugar beet projects in the Prairies or internment in POW camps in Ontario. The women and children were moved to six inland BC towns created or revived to house the relocated populace. Of the interned population, 11,500 went to Interior Housing Centres; 3,600 to sugar beet work; 3,000 to self-supporting projects and employment; 2,150 to Road Camps; and 750 to internment in Northern Ontario.<sup>5</sup>

## **Health Care**

Many Japanese-Canadians had better access to health care services in the Centres than they did outside the centres. Special attention had been paid to medical services in the camp because 25% of those interned were Japanese nationals. The Canadian Government did not want to aggravate the Government of Japan who held Canadian prisoners of war and

missionaries.<sup>6</sup> So, the Canadian Government was very conscious of the need for the internment camps to satisfy the international monitors of the Centres, the Red Cross and the protecting power, Spain. In camps where hospitals existed, it renovated and expanded them. If the centre did not have a hospital, one was built. Thus, at four centres, Tashme, Greenwood, Slocan and Sandon, the BCSC operated hospitals for the internees. At Kaslo, Lemon Creek, and New Denver, clinics were operated and use was made of the nearby community hospital. A hundred bed Tuberculosis sanatorium was operated at New Denver. Japanese doctors, dentists, optometrists and nurses were employed along with non-Japanese doctors at these hospitals. The number of beds available per thousand of the general population in 1943 in British Columbia was 6.8.<sup>7</sup> At Tashme, Greenwood, Slocan and Sandon from January 1943 to July 1944 there were and average of 19.8, 17.6, 18.6, and 19.3 beds per thousand respectively.

The evacuees received free medical care including pregnancy and hospitalizations. At that time this was a benefit few Canadians received. Children received attentions many parents could not afford and ailments and injuries were examined and treated without fear of costs. Also it was thought that moving the children from the high-density city to the country had a beneficial effect on their health.<sup>8</sup>

The Canadian Government claimed “conspicuous improvement” in the health of all evacuees, particularly the children because there were no epidemics during those years in the camps.<sup>9</sup> There was a complete program of free and voluntary immunization against typhoid fever, Scarlet fever, smallpox, diphtheria, and whooping cough. There were no mass outbreaks of typhoid, Scarlet fever, smallpox, diphtheria and whooping cough in the camps.<sup>10</sup> The health of the Japanese-Canadians in the settlements had been “excellent”. The children have “increased in average height and weight over the same age groups of oriental children at the Coast”.<sup>11</sup>

However, there were complaints among evacuees over the adequacy of medical care, the competence of local white doctors and the lack of modern equipment and facilities.<sup>12</sup> Additionally while many of the residents of the camps were relocated in the summer and fall of 1942, building of hospitals in some centres were not completed until spring 1943.

## **Maintenance and Food**

While the internees had better access to health care many developed health problems due to internment in the Centres. For those in the Centres with no income, the Canadian Government provided “necessary maintenance” in cash at provincial relief rates. The evacuees were expected to use these funds to purchase their own food and other items from local merchants. Families were also given plots of lands for gardens and given free seeds and the use of agricultural implements. Evacuees who had their property sold by the Alien Property Custodian had to draw a maximum of \$100 per month of their own money for living expenses until the family’s assets were down to \$260 per adults and \$50 per child.<sup>13</sup> To encourage movement to Eastern Canada, families who had moved out of British Columbia could withdraw as much money as they wanted.



The only work for men in the camp was earning between twenty-five and forty cents an hour while there was construction. For women, they could work as typists, store clerks or welfare workers.<sup>14</sup> Around 26-49% of the population in the centres was receiving partial or full maintenance depending on the season.<sup>15</sup> Between 15-20% of those in the centres were employed by the Government.<sup>16</sup> Overall, though the Canadian Government interned one-fifth the number of individuals the US government did, the Canadian Government spent one-third the amount the US Government spent.<sup>17</sup>

While the internees were receiving less money, the cost of living in the detention camps was higher than before entering the camps. This was partly because the traditional methods of economizing were unavailable. The evacuees could not depend on "the family vegetable garden, cheap fish unwanted by the canneries, shrimp and crab caught in English Bay or fruit picked at the farms of friends in the Fraser Valley and preserved for winter."<sup>18</sup> Welfare workers in the camp estimated that food allowances needed to be increased by 55% to meet basic dietary needs.<sup>19</sup> The government report concluding that there was a "wide variety and good quality foods available" and that present maintenance rates were "equal or slightly higher than usual relief rates" failed to take into account the profiteering that occurred in the towns these centres were built.<sup>20</sup>

## **Housing**

The Royal Commission on Japanese Welfare investigated conditions in the Interior Housing Centres. They concluded that "as a war-time measure" conditions were "reasonably fair and adequate".<sup>21</sup> The renovated old buildings were deemed equal to the pre-war housing of the Japanese Canadians, and newly constructed housing superior. The Royal Commission made these conclusions about the housing in the Centres by comparing them to housing found in the oldest sections of where the Japanese Canadians had lived in Vancouver.<sup>22</sup> No consideration was given to the climate differences between Vancouver and the Centres.

The BCSC built more than a thousand dwelling units and repaired or rehabilitated others. This was not completed in time for the winter of 1942 leaving many living in tents.<sup>23</sup> For many of the evacuees who were from Vancouver, the climate shock was great. Many of the new buildings were not insulated causing many to suffer from the cold. "The shiplap and tarpaper huts were not adequately sealed against Interior winters, and the wiring could not take electric heaters even if they had been available".<sup>24</sup> Each 28 feet by 14 feet cabin held a minimum of six people.

## **Future Directions**

Although much has been written about the incarceration of the Japanese Canadians during World War II, little has been written about the medical treatment provided by the Canadian Government to this group. Much of the discussions are brief and anecdotal. However, these camps are important as they can be used to examine the relationship between health care providers and their clients particularly when their clients are of a different ethnicity and have distinctly different status apart from being non-professionals. Further work must be done to come to a satisfactory conclusion about the health-care of Japanese

Canadians interned during World War II. This includes interviewing Japanese-Canadians who were interned in the Centres and those who were not. Additionally, actual administrative records about the Centres in the National Archives of Canada should be examined. Reports produced by the Red Cross and the Spanish envoy, whose country was the protecting power for the Japanese-Canadians, could be examined for alternative opinions on the care received.

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# RESPONSIBILITY AND HUMANITY - EXPLORING THE RELATIONSHIP BETWEEN ADOLESCENT RISK-TAKING BEHAVIOUR AND ORGAN SUPPLY

By

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## ABSTRACT

**Objectives:** Assessing the demographic of adolescent organ donation decisions and examining associations between risk-taking and donation decisions. The goal is to determine optimal setting for transplantation medicine education. **Hypotheses:** Responsible risk-taking, such as contraceptive use, should associate with socially conscious attitudes about organ donation. Rebellious risk-taking, such as illegal drug use, implies less social obligation with neglect of such choices. Decisions, motivated by information, should parallel historical adult cohort increases. **Methods:** A confidential, self-administered questionnaire polled 300 students and young adults. Risky behaviours included illegal drug use, cigarette smoking, alcohol use, sexual activity, bike helmet and seatbelt use, and in-hospital violent injury treatment. Understanding of brain death legislation in Canada was assessed. Outcomes were consideration about donating organs, decision making, willingness to donate, and communication of decision to family. **Results:** Positive association was found with risk-taking behaviour and thoughts and decisions about organ donation, particularly with responsible activity. Illegal risk-taking is negatively associated with such consideration. Adolescent participation in the donor pool has significantly increased over the last decade with a disproportionately higher increase in communicating such wishes to family members. **Interpretation:** Responsible risk-takers accept consequences of their activity and choose socially conscious behaviour. Illegal behaviour manifests rebelliousness and commitment to beliefs of invincibility. The positive evolution of the adolescent donation demographic presumably results from education about donation process and transplant success. Education is paramount at this unstable period, and information directed donor pool enlargement must involve a setting isolated from other teachings that may elicit attitudes of rebellion.

## Introduction

*"If I consent [to organ donation], I have tacitly accepted that my body is an assemblage of replaceable parts, that my 'self' is anatomically reducible to neural activity, and that when brain activity ceases, 'I' no longer exist."*(Baer, 1997)

Transplantation of cadaveric organs is one of modern medicine's greatest successes with improvements in technique and management transforming the field from frontier science to the treatment of choice for irreversible organ failure. The introduction of brain death criteria in 1968 defined when the body was deemed incompatible with sentient life and thus heralded a potential era of fresh organs for replacement. Canadians generally support this effort with 71% claiming willingness to donate whatever organs are necessary, however an annual rate of only 13.8 per million characterizes a country as having among the lowest donation in the developed world.(CORR, 2002) The adolescent age group has been historically implicated as responsible for a large proportion of motor vehicle accidents (Feldman, 2000), a significant contributor to the brain death diagnosis, yet less likely to have made a decision regarding the fate of their organs and to have communicated such a decision to their family. From the most recent decade comes evidence of increased decision making in all age groups resulting from education about organ need, donation procedure, and transplant success.

Adolescents face a variety of developmental influences including peer affiliations, important family roles, risk-taking behaviour, and a sense of morality that may all impact on their life decisions. (Fergusson, 1996) One may consider that risk-taking behaviours, generally beginning in middle adolescence (Ehrman, 1998), may bias the individual to prematurely consider death and its consequences. In a socially conscious being, this is reflected as increased propensity to make a decision. Responsible risk takers, such as sexually active young adults who consistently use contraceptives, who take precautions and act within the bounds of the law may recognize a moral standard inducing them to decide about their organs from an obligation to society. Those who act outside of the law, such as illegal drug users, may be more rebellious and deny or not realize any such obligation and thus not consider such decisions.

## **Methods**

A self-administered, confidential questionnaire was developed to assess the evolving demographics of adolescent organ donation decision-making and to examine potential associations between risk-taking behaviours and donation decisions. The first section addressed postulated risk factors of illegal drug use, frequent cigarette smoking, alcohol use, sexual activity, use of bike helmets and seatbelts, and in-hospital treatment for violent injury. The second section queried understanding of brain death legislation in Canada and the point beyond which it is ethically permissible to remove cadaveric organs. The third section inquired whether the respondent has thought about donating their organs, made a decision known by signing an organ donor card, the nature of their decision, and whether their families are aware of these choices.

A covering letter informed the respondents about the purposes of the study. Of 300 questionnaires that were distributed to high school students and young adults, 247 were returned completed. The primary form of analysis was intended to describe Canadian adolescent perspectives on organ donation with limited comparison to reported historical data.

### *Statistical Analysis*

- Data was validated by comparing risky behaviours in the sample population with reported American adolescent risk-taking.
- A baseline profile was developed concerning the following outcomes:
  - respondent understanding of current brain death legislation
  - respondents having thought about making an organ donation decision
  - respondents having made a decision and signed a donor card
  - respondents informing their family about their decision regarding organ donation
  - respondents willing to donate their organs
  - respondents informing their family that they are decided organ donors
- Student's t-test at a 0.05 level of significance was performed to compare current adolescent donation profiles with historical data reported in 1991.
- Student's t-tests at a 0.05 level of significance followed by multivariate regression analysis were performed to assess the impact of risk-taking behaviours on the above outcomes.

### **Results**

Data regarding organ donation decisions were analyzed from the 247 respondents. The age distribution was 124 (50.2%) from 16 to 20 years of age and 123 (49.8%) from 21 to 25 years of age. Distribution by sex was 128 (51.8%) female and 119 (48.2%) male. Results are outlined below:

The sample population incidence of each risky behaviour was calculated and compared to the 1999 American Youth Behaviour Survey. As shown in Table 1, there were no significant differences between the two samples.

**Table 1: Incidence of Risky Behaviours**

<b>Behaviour</b>	<b>Incidence</b>	<b>American YRBS (CDC, 1999)</b>	<b>p-value</b>
Frequent cigarette use	0.19	0.17	0.47
Alcohol use	0.84	0.79	0.44
Illegal drug use	0.16	n/a	n/a
Sexual activity	0.52	0.50	0.50
Casino gambling	0.37	n/a	n/a
Inconsistent seatbelt use	0.11	0.16	0.43
Inconsistent helmet use	0.24	0.15	0.41

Available historical data about adolescent participation in organ donation was tested against baseline data from the current sample population. As shown in Table 2, comparison with 1991 demonstrated that adolescents have significantly higher rates of thinking about organ donation as well as informing their families given that they have chosen to donate.

**Table 2: Sample Population Organ Donation Decisions**

Measure	Incidence	Historical (U.Reg. 1991)	p-value
Knowledge about brain death	0.74	n/a	n/a
Thought about decision	0.87	0.0 - 0.5	0.005 - 0.14
Made a decision	0.72	n/a	n/a
Family knows about decision	0.64	n/a	n/a
Willing to donate organs	0.48	n/a	n/a
Family knows <u>given</u> willing	0.75	0.03 – 0.15	0.03 – 0.08

A multivariate regression of self-reported excessive thinking about death against all of the risk factors was performed. The results, outlined in Table 3, indicate that onset of sexual activity, alcohol use, in-hospital treatment for violent injury, casino gambling, an inconsistent seatbelt use all correlated with increased propensity to have brood over the possibility of their own death.

**Table 3: Risky Behaviours and Self-Reported Excessive Thinking about Death**

Behaviour	Incidence of Excessive Thought About Death	p-value
Sexual activity	0.63	0.01
Alcohol use	0.48	0.04
In-hospital treatment	0.51	0.03
Illegal drug use	0.41	0.31
Frequent cigarette use	0.42	0.30
Casino gambling	0.50	0.04
Inconsistent seatbelt use	0.15	0.01
Inconsistent helmet use	0.32	0.26
All respondents	0.37	

Table 4 outlines the multivariate regression of each outcome on the risky behaviours considered. Outcomes of brain death knowledge, thinking and making organ donation decisions, willingness to donate, and familial communication were considered. Sexual activity and alcohol use were found to positively impact all of the outcomes. In-hospital treatment for violent injury correlated positively with all outcomes except communicating decisions to family. Illegal drug use manifested a negative association with making decisions and willingness to donate organs.

**Table 4: Risky Behaviors and Organ Donation Decisions**

<b>Risk factors</b>	<b>Knowledge of Brain Death</b>	<b>Thought about decision</b>	<b>Made decision</b>	<b>Family aware of decision</b>	<b>Willing to donate</b>
Sexual activity	0.007	< 0.001	0.05	0.018	0.008
Alcohol use	< 0.001	< 0.001	< 0.001	0.05	< 0.001
In-hospital treatment	0.05	0.05	< 0.001	0.32	0.027
Illegal drug use	0.45	0.11	0.05 negative association	0.24	0.04 negative association
Frequent cigarette use	0.43	0.29	0.48	0.22	0.32
Casino gambling	0.33	0.483	0.35	0.38	0.19
Inconsistent seatbelt use	0.29	0.21	0.30	0.22	0.48
Inconsistent helmet use	0.30	0.35	0.32	0.19	0.25
Age	0.15	0.22	0.37	0.26	0.24

Noteworthy is that among those who are sexually active, responsible activities of consistently using contraceptives and protection against sexually transmitted infections correlated with higher rates considering organ donation ( $p = 0.003$ ,  $0.05$ ) and making decisions ( $p = 0.04$ ,  $0.03$ ). Also, arrangement to donate among the sampled individuals aged 16 to 25 years, determined to be 48.2%, did not differ significantly from the national adult average of 58% ( $p = 0.42$ ).

Background knowledge about brain death and the organ donation procedure was found to impact on participation in the donor pool. As shown in Table 5, those with a correct understanding about what brain death entails and the steps taken in organ harvest were more likely to have thought about and made decisions concerning organ donation, to be willing to donate, and to have informed their families about decisions made.

**Table 5: Knowledge about Brain Death and Organ Donation Decisions**

<b>Measure</b>	<b>Incidence with understanding about brain death</b>	<b>Incidence without understanding of brain death</b>	<b>p-value</b>
Thought about decision	0.90	0.78	0.012
Made decision	0.77	0.58	0.0016
Family knows about decision	0.70	0.52	0.02
Willing to donate	0.54	0.31	< 0.001
Family knows <u>given</u> willing	0.80	0.50	0.002

Dependence of each outcome on sex was evaluated and results are summarized in Table 6. Females are significantly more likely to thought about and made decisions concerning organ donation, to be willing to donate, and to have informed their families about decisions made.

**Table 6: Sex and Organ Donation Decisions**

Measure	Male	Female	p-value
Thought about decision	0.72	0.88	0.03
Made decision	0.64	0.80	0.002
Family knows about decision	0.54	0.71	0.001
Willing to donate	0.40	0.56	0.004
Family knows <u>given</u> willing	0.66	0.81	0.04

## Discussion

*“A man is dead when he has undergone irreversible changes of a type that makes it impossible for him to seek to litigate.”* (Medawar, 1957) Circulatory, ventilatory, and brain function have been historically linked in the public and medical eyes as one system’s failure inevitably lead the others to fail. Advent of intensive care units forced distinction between biological death and the person’s end in order to assess the ethically permissible moment to harvest cadaveric organs. Over 70% of respondents were correctly aware of this definition regardless of age ( $p = 0.15$ ).

The transition from childhood to adulthood introduces many changes impacting on adolescent development. Middle adolescents (15 to 17 years) are largely influenced by their peer groups and are characterized by concrete responses to stressful situations. This often manifests as an overcompensating sense of omnipotence resulting in risk-taking behaviours that include experimentation with drugs, alcohol, and sexual activity. Late-stage adolescents (18 to 21 years) begin to develop abstract reasoning with a background of moral, religious, and sexual values. Losing a belief of invincibility and accepting one’s own mortality may associate the individual with a role in society and force consideration of a potential early demise. (Ehrman, 1998) Education is also of fundamental importance to a youth’s development and may also introduce elements of transience into the individual’s psyche. It is incumbent on the transplantation arena to recognize which of these factors determine the public’s decisions surrounding their organs in order to better focus efforts to increase donation.

Deciding the fate of one’s body after death is difficult, and religious, moral, and familial convictions must be respected. Cadaveric organ transplantation has evolved from scientific novelty to mainstream medicine with one-year survivals for kidney and heart transplants besting 94% and 81% respectively. (Arnold, 1996) However, adolescents and young adults risk having insufficient information about the success of transplantation medicine, inadequate understanding of their mortality and their role in society, and incomplete communication with one’s family about their intentions. Knowledge about the correct definition of brain death was positively associated in subjects aged 16 to 25 years old with thinking about donating organs ( $p = 0.012$ ), making definite decisions ( $p = 0.0016$ ), willingness to donate their organs ( $p < 0.001$ ), and informing their family of the decision ( $p = 0.02$ ).

For historical comparison, unpublished data from the University of Saskatchewan in 1991 was reported in a related article (Stiller, 1994) stating that half of Canadian adolescents have



not considered their own death, let alone made decision of donating their organs after an expected demise. Similarly then only between 3 and 15% of donors recognized the importance of informing next of kin who will be equally responsible for confirming their wishes. (Arnold, 1996) Currently, 87% of respondents report having thought about organ donation with 72% having made a decision known on a donor card. Adolescents now represent a societal cohort whose level of informed participation with correct procedure compares to the average Canadian and is marked improvement from a decade ago. Families have been informed by 64% of those who have made decisions, 75% if their decision was to donate their organs. Individuals must discuss organ donation with their family to facilitate the process after having decided because both donor and family consent is required in Canada. Historically, if the deceased patient's desire to donate was known, 92% of families comply; substantially lower at 53% if no discussion had taken place. (Arnold, 1996)

Information about adolescent behaviour in Canada is scarce so comparison of the respondent profile was made with the 1999 Youth Risk Behaviour Survey (CDC, 1999) for data validation. There were no significant differences in the incidences of alcohol use ( $p = 0.44$ ), sexual activity ( $p = 0.50$ ), frequent cigarette use ( $p = 0.47$ ), regular seatbelt use ( $p = 0.43$ ), and regular bicycle helmet use ( $p = 0.41$ ) between the respondents and the American youth.

Adolescent risk-taking, while long thought to be a product of reduced inhibition following alcohol experimentation, is now perceived to have a non-causal association arising from common life factors that also predispose the individual to alcohol use. Social disadvantage, family dysfunction, and peer association are among the strongest such factors with major outcomes of early and risky sexual activity, alcohol and illegal substance use, frequent cigarette use, and laxity regarding seatbelts and helmets. It is conceivable that the predisposing factors and engagement in such activities induces a degree of acknowledgment of an individual's mortality. This postulate is supported by positive associations between drinking ( $p = 0.04$ ), sexual activity ( $p = 0.01$ ), casino gambling ( $p = 0.04$ ), in-hospital treatment for violent injury ( $p = 0.03$ ), and inconsistent seatbelt use ( $p = 0.01$ ) and self-reported excessive time devoted to thinking about death.

It is first important to summarize the relationships between the risk-taking behaviours and the outcomes assessed:

- Sexual activity ( $p < 0.001$ ), alcohol use ( $p < 0.001$ ), and previous in-hospital treatment for violent injury ( $p = 0.05$ ) were all found with increased prevalence in people who had considered organ donation.
- Sexual activity ( $p = 0.05$ ), alcohol use ( $p < 0.001$ ), and previous in-hospital treatment for violent injury ( $p < 0.001$ ) characterized adolescents who had made a decision regarding the fate of their organs. Incidentally, illegal drug use ( $p = 0.05$ ) was found to negatively associate with making a decision.
- Sexual activity ( $p = 0.008$ ), alcohol use ( $p < 0.001$ ), and previous in-hospital treatment for violent injury ( $p = 0.027$ ) were found in those willing to donate their organs. Incidentally, illegal drug use ( $p = 0.04$ ) was found to negatively associate with willingness to donate.

- Sexual activity ( $p = 0.018$ ) and alcohol use ( $p = 0.05$ ) positively correlated with familial communication regarding an individual's desire to posthumously donate their organs.

All of these relationships were found to be independent of age ( $p = 0.08 - 0.43$ ), and women were found to have significantly higher rates than men of thinking about organ donation ( $p = 0.03$ ), making a decision ( $p = 0.002$ ), being willing to donate ( $p = 0.004$ ), and communicating wishes to their family ( $p = 0.01$ ).

Support is found for the hypothesis that engaging in risky behaviours was predictive of people having considered their own death. Acceptance of one's own mortality conceivably predisposes thought of circumstances around one's untimely demise. Noteworthy is that responsible risk-taking, such as consistent use of contraceptives, leads to significantly even greater propensity to think about organ donation ( $p = 0.003$ ) and make decisions ( $p = 0.04$ ) than does unprotected intercourse. This heightened sense of responsibility also dictates discussion with next-of-kin ( $p < 0.001$ ). Conversely, there is a negative association between illegal drug use and decision about organ donation ( $p = 0.05$ ). The described responsible risk-taking might represent individuals who have accepted their mortality but choose to act in a socially conscious method, one articulation of which is choosing to support the organ donor pool. Illegal drug use, by definition, lies outside the bounds of law, and users are likely to be less mindful of their role in society. This rebelliousness and unshakeable commitment to a sense of immortality may explain the less prominent decision making among substance abusers.

The implications of these findings on practices to improve donation in Canada are found in the realm of education. Information about the success of transplantation medicine is essential to informed consent and has been shown associated with higher donation rates and more prevalent discussion with family members. Also, normal adolescence is characterized by a sense of omnipotence followed by development of abstract moral reasoning. This is a time when an individual faces the reality of their own mortality and accepts that they have a role in society. It is at this age, in a high-school or driver's licensing setting, that information might be best transferred. A caveat is that success will likely be more effective if this potentially rebellious group is not approached with other health information including campaigns against alcohol use, smoking, illegal drug use, and early sexual activity.

## Conclusions

Adolescence is a developmental phase during which feelings of omnipotence and disregard for society yield to a sense of abstraction guiding moral development. Behaviour is largely dependent on peer association and an early belief of invincibility predisposes individuals to experiment with risky behaviours. Such experimentation, particularly in the face of peer group morbidity, may lead one to accept that they may be injured by their behaviour with a concomitant sense of obligation to society. A positive association was found with risk-taking and thoughts about organ donation, particularly in the setting of responsible activity. These youths have accepted that their actions have consequences and a corresponding obligation to society, a realization that leads to socially conscious behaviour. In contrast, risky behaviour

outside the law is a manifestation of rebellion against authority and firm belief of invincibility. Both of these may explain the negative association with consideration of organ donation. For historical comparison, overall adolescent participation in the donor pool has significantly increased in the last decade, presumably from increased knowledge about the donation process and improved transplant success. Education is paramount at this highly unstable time in one's life, but any information must be conveyed in a setting isolated from other health information that may foster rebellion.

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## *Notes*

The following students made a presentation at the conference but did not submit a formal manuscript for publication.

**Is Hippocrates the Father of Medicine? The Influence of Ancient Egyptian Medicine on Ancient Greek Medicine**.....Abbas Khani-Hanjani  
.....University of Calgary

**The Method to Hippocrates Madness: A Review of the Logic behind the Theory of the Four Humors** .....Jennifer Twiss  
.....University of Calgary

**Winston S. Churchill's Stroke in 1953: The Medical and Political Consequences**  
.....Elizabeth Wilcox  
.....University of Calgary